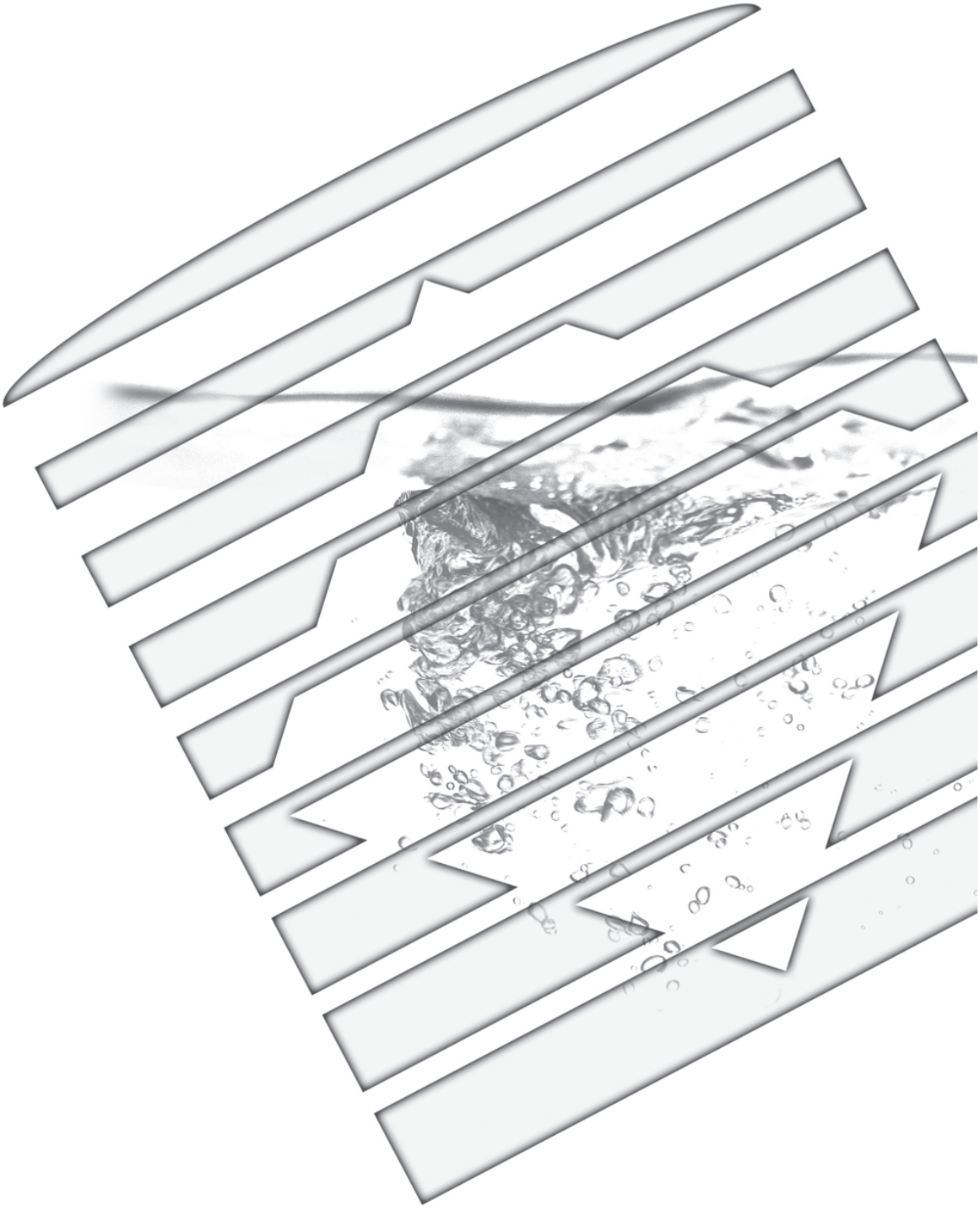
FuelsManager® OIL & GAS

ADM010GVAE0713
Software Version 7.5 SP3

Administrator Manual



Automation Solutions for oil & gas, defence and aviation applications

Varec®

Copyright

All rights reserved. Printed in the United States of America.

Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means- electronic, mechanical, photocopying, recording or otherwise- without the prior written permission of the Publisher:

Varec, Inc.
5834 Peachtree Corners East
Norcross (Atlanta), Georgia 30092
Phone: (770) 447-9202
Fax: (770) 662-8939

Trademarks Acknowledged

Varec, Inc. recognizes all other trademarks. Trademarks of other products mentioned in this manual are held by the companies producing them.

FuelsManager®, TankView®, TacFuels® and Varec® are registered trademarks of Varec, Inc.

Acrobat Reader® is a registered trademark of Adobe Systems Incorporated.

Crystal Reports® is a registered trademark of Business Objects.

HTML, DHTML, XML, XHTML are trademarks or registered trademarks of W3C®, World Wide Web Consortium, Massachusetts Institute of Technology.

Microsoft®, WINDOWS®, NT®, EXCEL®, Word®, PowerPoint® and SQL Server® are registered trademarks of Microsoft Corporation.

SAP, SAP Logo, R/3, mySAP, mySAP.com, and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP AG in Germany and in several other countries all over the world.

All other product and service names mentioned are the trademarks of their respective companies.

Using This Publication

The *FuelsManager Defense Dispatch and Fuels Accounting User Manual* explains the basics of working with FuelsManager Defense Version 6.0, including set up, menus, queries, and reports. It also provides detailed steps and procedures required for using the Dispatch and Accounting applications.

Before reading this publication, you should become familiar with the operation of Microsoft Windows. This manual is intended for system administrators and local administrators. For additional information about the FuelsManager Defense application, contact the Help Desk in Atlanta at DSN 697-6733 or at the toll-free number 1-800-446-4950.

Getting Started vii
Using This Manual vii
Windows Terminology vii
Actions in Windows vii
Window Elements viii

1 Introduction 1
Overview 1
New Options Available 1
Licensing Options 1
Standard Edition 2
Professional Edition 2
Comparison of Edition Features 2
System Architecture 4
Real-Time Database 4
Trends 5
On-line Help 6
FuelsManager Services 6
FMSystemManager 6
DataManager 7
CommManager 8
ReportManager 8
ArchiveManager 8
FuelsManager Applications 8
FuelsManager Configuration 8
Operate 9
Draw 9
Report 9
Selecting Remote FuelsManager Systems 10

2 Configuring Security 11
Microsoft Windows and FuelsManager Security 11
Categories 12
Working with Alarm Categories 13
Creating, Deleting or Renaming Tag Categories 15
Users and Groups 16
Creating and Editing Users 16
Creating and Editing User Groups 17
Access 19
System and Tag Permissions 19
System Permissions 19
Audit 23

Reviewing the Event Log 24
Security Authentication 24

3 Setting System Parameters 25

Working with Configuration 25
Opening Configuration 25
Exiting Configuration 25
Setting Subsystem Run Modes 25
System Selection 26
FuelsManager file directories 27
Setting up file directories 29
Defining System Resources 29
Products 29
Assignment Options (Product) 30
Strings 32
Coded variables 34
Modifiers 35
Managing Help files 36
Start definitions 38
Configuring Translation Tables 39
Lookup Tables 39
Scaling Functions 42
Changing the Default Tank Detail Display 43
Changing the Operate Tabbed Window Display Setting 44

4 Configuring Alarms and Events 45

Types of Alarms 46
Global Alarms and Local Aarms 46
Alarm Templates 46
Predefined or User-Defined Alarms 46
Predefined Alarms and Alarm Templates 46
Predefined Global Alarms and Alarm Templates 46
Predefined Tank Point Alarms 47
Changing Alarm Settings 47
Changing the Alarm Line Format 47
Changing the Alarm Display Mode 48
Showing the Date, Time and User Name 49
Working with Global Alarms and Alarm Templates 50
Understanding Global Alarms and Alarm Templates 50
Opening the Global Alarms and Alarm Templates List 50
Creating a Global Alarm or Alarm Template 51
Editing a Global Alarm or Alarm Template 52
Assigning a Global Alarm to a Database Point 52

Importing and Exporting Global Alarms and Templates 53
Working with Local Alarms 54
Accessing the alarm configuration for a point 54
Creating and Assigning a Local Alarm 54
Editing a Local Alarm 55
Assigning a Graphic or a Help File to an Alarm 56
Removing an Alarm from a Database Point 57
Importing and Exporting Points 57
Working with Alarm Limits 59
Accessing Alarm Limits 59
Creating, Editing, and Removing Alarm Limits 59
Applying a Reset Holdoff to Alarm Limits 60
Building an Alarm Limit using the Build Button 61
Working with Events 62
Creating an Event 62
Editing an Event 63
Removing an Event from a Database Point 63
Alarm & Event Logs 64
Printing Alarm and Event Logs 64
Viewing the Alarm and Event Log 64
Disabling Event Logging from OPC Data Sources 64

5 Configuring Database Points 65
Introduction to Databases 65
Point Types 66
Tank Point 66
Input Point 66
Output Point 66
Triggered Point 66
Point Attributes 66
Engineering Units 67
Scale Limits 67
Data Source 67
Data Format 69
Alarms and Events 69
Tag Category 69
OPC Server Support 70
What is OPC? 70
OPC Data Access 70
OPC Server Tags 71
Supported client and server interface 71
Setting the Number of Database Levels 72
Creating Database Points 72

Creating Input and Output Points 74
Creating and Editing Triggered Points 78
Edit Point Window 80
Creating and Editing Tank Points 82
General Information 82
Volume Information 83
Process Data Information 85
Alarm Information 86
Vessel Information (Vessel 1 & Vessel 2 Tabs) 89
Polynomial Sphere Information 94
Weights & Measures Information 95
Strapping/Water Table Information 96
Strap, Water and Hydro Definition Modes 98
Leak Detection 99
Assigning Data Sources 99
Opening the Database IO Connections Window 100
Engineering Units Conversion 103
Configuring Bit Field Data Sources 104
Copying and Renaming Points 105

6 Archiving Information 109
ArchiveManager 109
ArchiveManager Prerequisite 109
Opening ArchiveManager 109
ArchiveManager Configuration 110
Select a real-time database 110
Add or connect to an archival data source 111
Setting Options 112
Archiving Parameters 113
ArchiveManager – EOM Backup 114
Point Variables 114
Adding point variables to ArchiveManager 114
Editing point variables 115
Deleting point variables 115
Records 116
Tank Point Records 116
Input Point Records 116
Output Point Records 117

7 Configuring Communications 119
Communications interface configuration 119
Creating a new interface 119
Communications port configuration 121

Locked interfaces and devices 121
Device configuration 122
I/O Point connections 122
Maintenance 123
Change interface mode 124
Device maintenance 124

8 Configuring Product Movement 127
Movement types 127
Blend 127
Charge 128
Receipt 128
Run-down 128
Shipment 129
Transfer 129
Water-drain 129
Xfr modes 129
Transfer by Level 130
Transfer by Volume or Mass 130
Definitions 131
Movement summary 131
Receipt 131
Shipment 131
Movement history 133
Defining Movement Paths 133
Before you start 133
Accessing the movement configuration 133
Defining nodes 134
Defining Sources and Destinations 137
Defining groups 138
Editing Movement Paths 139
Modifying Nodes 139
Deleting Nodes 139
Deleting Sources and Destinations 139
Exporting & Importing Movement Elements 140
Exporting Movement Elements 140
Importing Movement Elements 141

9 Configuring the System Update Utility 143
Before Updating Your Database 143
Items not updated 143
Running the Utility 143
Error messages and troubleshooting 145
Error messages 145

Troubleshooting 146
After Updating the Database 146

10 Creating Graphics 147

How Draw graphics are used in Operate 147

Opening and Exiting the Draw Application 148

Opening Draw 148
Exiting Draw 148

Understanding the Draw window 148

The Drawing space 148
The Draw toolbar 149
Drawing tool icons 149
Pen & brush box 149
Message window 149
Text & background box 149

Setting Up the Drawing Space 149

Displaying and Setting Up the Grid 149
Showing appends 151
Displaying mouse coordinates 151
Displaying object coordinates 151
Creating user defined colors 152

Managing Graphic and Symbol Files 152

Opening an existing graphic or symbol 152
Understanding graphic and symbol file types 152
Before You Begin 153
Creating a graphic 153
Creating a template graphic 153
Defining Templates for a Template Graphic 154
Setting the size of a graphic 154
Creating a symbol 155
Generating files 155
Generating multiple files 155
Using file indexes 156
Saving files 157
Purging files 158
Merging files 158

Using the Draw Tools 158

Basic Techniques 158
Changing the Default Settings 159
Drawing Simple Shapes 160
Drawing a label 161
Inserting a value 162
Inserting a bar graph 163
Placing a symbol in a graphic 165
Placing an append button in a graphic 165

Inserting a bitmap 170
Editing objects 171
Selecting an object 171
Deleting an object 171
Next & previous 171
Attributes 171
Push to back & pull to front 171
Copying single objects 172
Moving, deleting, and copying multiple objects 172
Undo last 172
Redrawing the screen 172
Resizing objects 172
Using Dynamic Conditions 173
Creating a Dynamic Condition 173
Assigning a condition 174
Editing a Dynamic Condition 176
Customizing Tank Detail screens 176
Process overview 177
Creating a custom tank detail 177
Keyboard shortcuts for Draw tools 179

11 Configuring Leak Detection 181
Volumetric Analysis 181
Mass Analysis 182
Tank Analysis Types 182
Static Analysis 182
Continuous Analysis 182
Real-Time Analysis 183
Security 183
ArchiveManager 184
Edit Tank Data 186
Process Data 186
Alarms 187
Vessel 1 188
Vessel 2 189
Leak Detection page 190
Tank Analysis Methods 191

12 Configuring Automated Data Output 193
Program Location 193
Output File Types 194
Automated Data Output Configuration Dialog 195

Configuring Automated Data Output 198
Initial Setup 198

13 Setting Calculation Methods 199

Volume correction methods 199
Data rounding 199
Volume correction techniques 200
Petroleum tables 200
Chemical tables 202
Liquid Hydrocarbon Gas Table 203
Asphalt Tables 203
Polynomial 203
Traditional tank calculations 203
Strap Table Volume (TOV) 203
Product and Water Strapping Tables 206
Floating 210
Bottom Sediment Water (BS&W) 211
Volume of Sediment and Water (VSW) 211
Free water 211
Correction volume 211
Volume Correction Factor (VCF) 211
Tank Shell Correction (CTSh) 211
Gross Observed Volume (GOV) 212
Net Standard Volume (NSV) 214
MASS 217
Remaining volume/remaining mass 219
LPG quantity calculation from liquid density 220
Details for each step 221
Sample LPG calculation 227
Stored Data 227
Hydrostatic & Hybrid Tank Calculations 230
Hybrid Calculation 231
Hydrostatic Calculations 232
Typical Tank Calculation 232
Analytical and Measured Data 232
Tank Point Configuration Parameters 233
Flow calculations 234
Flow 234
Level rate 234
Mass flow 235
Net flow 235

14 Using Weights and Measures 237
System Overview 238
Sealing the Point in 8130 RTU 238
Applying the Software Seal 241
W&M Checksums 242
W&M Seal Communications 242
Sealing TankPoint variables in FuelsManager 243
Applying the Software Seals 243
Changing a Seal State for a Process Variable 243
Display of W&M Indicator on Graphics & Reports 245
Sealing FuelsManager Modules 246
Changing a Seal State for a module 247
Setting the W&M Password 248
Systems Seals 248

15 Administering Reports 251
Report 251
Opening Reports 251
Exiting Reports 251
Predefined standard reports 251
Tools and objects for reports 252
Tables 252
Labels 252
Values 253
Summary reports 254
Creating a new summary report 254
Creating a table in a summary report 255
Creating labels in a summary report 256
Creating values in a summary report 257
Creating column totals 258
Dynamic reports 259
Creating a new dynamic report 259
Formatting reports 261
Setting the default font 262
Setting the report layout 262
Editing reports 264
Opening an existing report 264
Editing report objects 264
Managing report files 265
Saving reports 265
Generating reports 265

Deleting reports 266
Historical reports 267

16 Configuring the FuelsManager Web Server 269
Before You Begin 269
Task Overview: Configuring the Web Server 269
Logging In to the Web Server as an Administrator 269
Defining Site Properties 270
Defining Users and User Groups 271
Introduction to Users, User Groups, and Security 271
Understanding How Security is Implemented 272
Setting Up User Groups and Users – Overview 272
Adding a User Group 272
Adding a User 275
Defining Products 276
Renaming Labels with the Data Dictionary 276
Defining a Data Dictionary Automatically (Importing) 277
Defining a Data Dictionary Manually 277
Exporting a Site Data Dictionary to a File 277
Setting Regional Settings 278
Setting Up Tank Farm Monitoring 278
Adding Tanks with AutoCreate 278
Adding Tanks Manually 279

17 Configuring Web Server Reporting 281
Before You Begin 281
Prerequisites 281
Key Information 281
Task Overview: Configuring Web Reporting 281
Task Overview: Configuring Reports 282
Creating a User in Windows for Reports 282
Create a User in SQL Server for Databases 282
Creating a User in Report Manager for Reports 283
Opening Report Manager 283
Create a Reports Directory in Reporting Services 284
Creating a Data Source in Report Manager 284
Deploying Reports to the Report Server 286
Setting Report Properties 286
Opening the Report Properties Page 286
Renaming, Hiding, or Showing a Report 287
Setting Report Parameters 287

Setting Data Source(s) Manually for Each Report 288
Setting Report Server & Standard Report Addresses 289
Setting the Report Server Address 289
Setting the Reports Directory 289
Choosing How the Report List is Displayed to Users 289
Creating a Report Group 290
Assigning Reports to a Report Group 290

18 Configuring Multiple Monitors 291
Multi-Monitor Prerequisites 291
Configuring Multiple Monitors 292
Multiple Monitor Examples 293

A Point Parameters 295
Tank Points - Process Data 295
Product Transfer Data 302
Tank Alarms Data 303
Scaling and engineering units data 310
Tank configuration data 313
Input points - process data 318
Output points - process data 318
Triggered points - process data 320
Units 321
Point format 328
Coded Variables 329
Modifiers 332
Tank strapping table 333

Getting Started

The FuelsManager Oil & Gas Administrator manual explains how to configure the FuelsManager Oil & Gas 7.5 SP3 suite of products.

Using This Manual

Before reading this guide, you should become familiar with the operation of Microsoft Windows. This manual is intended for system administrators, managers, engineers, and other top-level management. A separate guide entitled *FuelsManager Oil & Gas 7.5 SP3 User Manual* is available for operators.

Windows Terminology

FuelsManager user interface is based upon the Microsoft Windows Graphical User Interface (GUI) standard and is SAA-compliant (System Application Architecture standard for open systems). All top-level menus, dialog boxes, and mouse-driven interfaces adhere to the published standards for Microsoft Windows. This manual uses the terms described in the following tables when describing operator actions and windows elements for step-by-step instructions.

Actions in Windows

Actions	Description
Point	To move the mouse pointer until it rests on the item of choice.
Click	To quickly, press and release the mouse button once.
Double-click	To quickly, press and release the mouse button twice in succession.
Drag	To hold down the mouse button while moving an object across the computer screen.
Release	To quit holding down the mouse button after dragging an item.
Select	To pick an item on a menu, button or to highlight text or graphics usually via a single click). Selecting does not initiate an action.
Choose	To pick an item to carry out an action. Often needed to select an item before choosing it (usually via a double-click).

Window Elements

Elements	Description
Program Icon	Provides a pop-up menu, which allows window modification.
Title Bar	Shows the title of the application, document or FuelsManager graphic screen.
Menu Bar	Lists of available menus. Most applications have a File menu, Edit menu, and a Help menu, as well as menus unique to the application.
Menu	A menu contains a list of commands or actions performed by the operator. Also referred to as a pop-up/ drop-down menu.
Dialog Box	A movable window that is displayed on screen in response to the user selecting a menu option. It provides the current status and available options for a particular feature in the application.
Window	A scrollable viewing area on screen. May refer to the entire application in a window.
Window Title	The Window title can be the name of an application, document, group, directory or file depending on the type of window in which it appears.
Close Button	Use this button to close the window or application.
Maximize Button	Use this button to enlarge the application window so that it fills the entire desktop.
Minimize Button	Use this button to reduce the application window to an icon at the bottom of the screen.
Restore Button	This button can restore an application window to its previous size and location.
Window Border	The Window border is the outside edge of a window. The user can change the window size by dragging the border in or out on each side of a window.

1 Introduction

FuelsManager Oil & Gas is a software toolset for the management of bulk liquid assets in tank farms, terminals, and refineries. FuelsManager is available in Standard and Professional Editions.

Overview

FuelsManager integrates all major types of tank level and mass measurement instruments, including float, radar, servo, hydrostatic, intelligent, magnetostrictive, and hybrid tank gauges into one system.

Storage tank parameters such as level, temperature, gross, and net standard volumes are displayed at an operator workstation. In addition, FuelsManager can be networked with other PC or Host Computer systems. FuelsManager operators can view the facility using predefined graphical displays, tabular displays, or with real-time Graphic Displays.

This system runs with any of the following operating systems:

- Microsoft XP Professional 32-bit SP3
- Microsoft Windows Server 2003 Standard 32-bit and 64-bit
- Microsoft Windows Server 2003 Advanced 32-bit and 64-bit
- Microsoft Windows 7 Professional 64-bit
- Microsoft Windows Server 2008 Standard 32-bit and 64-bit
- Microsoft Windows Server 2008 Enterprise 32-bit and 64-bit

FuelsManager operates on a single PC, or as part of a network, and is available in Workstation or Server configurations.

New Options Available

The FuelsManager Web Server utilizes the latest in Microsoft technology, such as .NET and SQL Reporting Services, to enable your remote users and customers to access data relevant to their business operations, including current inventories, plant status and reports, via the Internet/Intranet.

The FuelsManager Web Server Interface is available as an Online Web Server Interface Option for FuelsManager Standard or Professional Editions. The Web Server Interface Option provides access to a single site.

Licensing Options

The FuelsManager software suite is available as a licensed product with various levels of functionality. Each edition is available pre-installed on a PC or as a software license only.

The FuelsManager license pre-installed onto a PC includes the following deliverables:

- PC with minimum required features for workstation or server editions
- Electronic copies of the user and operator manuals
- CD with files necessary to install the FuelsManager and ViewRTU software
- Software protection key
- Windows XP, Windows 7, or Windows 2003/2008 Server license

Standard Edition

FuelsManager Standard Edition provides software for bulk liquid asset management, including tank gauging, inventory management, alarm management, reporting, and OPC. This edition supports predefined graphics and reports, but does not support custom graphics or reports. FuelsManager Standard Edition does not support SCADA functionality.

FuelsManager Standard is intended for standalone systems or as a client to the Professional Edition installation.

Professional Edition

FuelsManager Professional provides all the functionality of the Standard Edition, and adds real-time SCADA functionality, a customizable user interface, and environmental compliance. FuelsManager Professional Edition can also act as a data server and provide inventory data to other FuelsManager Professional or Standard Edition systems. Each FuelsManager workstation on the network has its own licensing key.

FuelsManager Professional is intended for medium- to large-sized networks where the customer needs to be able to customize the operator interface and show data over a network.

FuelsManager Web Server Option provides a web server that enables your remote users and customers to access and compile FuelsManager data for your FuelsManager Standard or Professional site.

Comparison of Edition Features

The following table shows the features and abilities of the FuelsManager Standard and Professional Editions. For more information, contact Varec at 1-866-MY-VAREC.

Feature	Standard Edition	Professional Edition	Optional Features[2]
Get moving quickly and easily. Predefined tank templates, tabular and graphical tank groups.	✓	✓	✓
Operate to international standards. Select industry standard volume correction methods, including API, ASTM, IP, JIS, GOST, GB/T, polynomial and others.	✓	✓	
Know your product inventory. All measured and calculated storage tank parameters are displayed in the engineering units you specify.	✓	✓	
View, modify and control. All parameters can be controlled online through the industry standard Windows® user interface.	✓	✓	
Integrate all tank gauges into one system. Allows seamless communications to various manufacturers' tank gauges via the 8130 RTU or TankGate interfaces.	✓	✓	
Improve safety and prevent tank overfills. Comprehensive real-time alarm and event management.	✓	✓	
Standardized reporting. Print or save standard reports of your daily operations, including alarm, events, historical data and others.	✓	✓	
Connect to your facility's control or information systems. An OPC client/server interface allows seamless integration of data to and from OPC equipped systems.	✓	✓	

Feature	Standard Edition	Professional Edition	Optional Features[2]
An OPC client interface allows seamless integration of data to and from OPC equipped systems.	✓	✓	
An OPC server interface allows seamless integration of data to and from OPC equipped systems.		✓	
Control your liquid assets. SCADA functionality, such as pump and valve control, allows you to control and monitor your facility.		✓	
Designed for the way you operate. User configurable tank detail templates, displays and reports can be modified for your specific business operations.		✓	
Extended integration possibilities. Additional communications drivers are provided to allow direct connectivity to tank gauging devices, PLCs, DCS and other I/O systems.		✓	
Create a FuelsManager network. Provide data to multiple FuelsManager Oil & Gas Standard Edition workstations.		✓	
Web access to SCADA information: View the current status of all pumps, valves and other control equipment for all connected FuelsManager systems at your site via a simple web browser.			✓
Reporting services. View, export and schedule reports for email delivery that centralize inventory data from across your entire site.			✓
Track product movements. Integrated movement system designed to track bulk product transfer to and from your facility or from tank to tank within your facility.[3]			✓
Automate data output. Periodic or triggered logging of user specified data to CSV, HTML or XML data files.			✓
Monitor for leak conditions. Integrated statistical analysis of historical data designed to detect possible leaks from underground storage tanks to EPA standards.			✓
Estimate tank emissions. Offline analysis of historical data provides throughput calculations to assist with EPA Title V permitting.			✓
Share information more effectively. A web interface allows you to publish your facility's operational information and reports to users throughout your organization.			✓
Custom applications that allows access via the FMAPI.		✓	

[1]Requires FuelsManager Oil & Gas to be installed at integrated facilities.

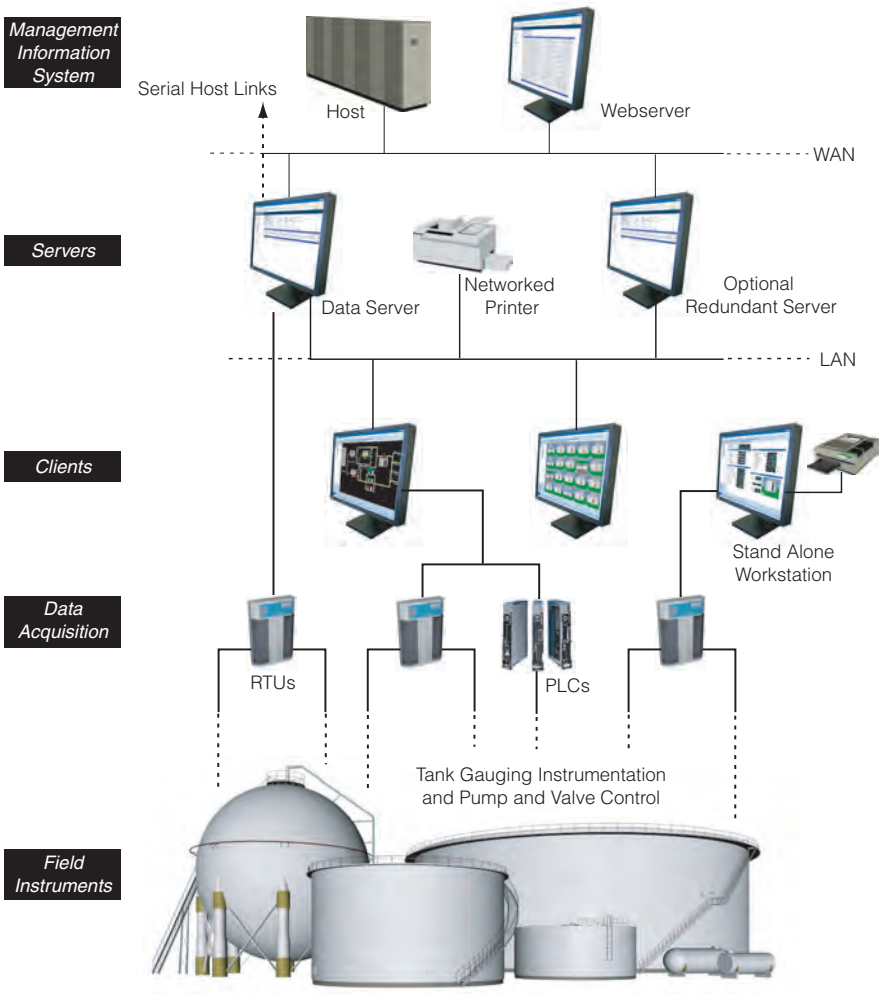
[2]Requires FuelsManager Oil & Gas Standard or Professional Edition to operate

[3]Product Movement System requires FuelsManager Professional Edition to operate

System Architecture

The FuelsManager System consists of a real-time database and integrated applications and services that interact in a client/server architecture using the Windows XP, Windows 7, or Windows 2003/2008 Server operating systems.

This section describes the real-time database and the FuelsManager services.



Real-Time Database

FuelsManager maintains a real-time memory-resident database consisting of input values, calculated values and operator-entered values. The system supplied is completely pre configured to fully support the required functions. Refer to the Database chapter for procedures on editing the database.

The FuelsManager real-time database offers the following features:

- Volume Calculations
- Multiple Users
- Multiple databases
- Online Configuration
- Alarms

- Events and Event logging
- Trends
- Online help

Volume Calculations

FuelsManager performs automatic database calculations based on changes to database point values. Changes may be due to receipt of new input data from external sources, other database calculations, or timed events.

FuelsManager includes a comprehensive set of tank volume calculations for storage tank data. To review correctional methods used to calculate tank data, refer to the Tank Calculations chapter.

Multiple Users

FuelsManager supports simultaneous access to configuration data for multiple users. It maintains database integrity by locking database points that are currently selected for modification.

Multiple Databases

Each machine has its own database and data management system (called FMDataManager). No more than one database can be created on a single machine, but users can access databases from other network machines.

On-Line Configuration

FuelsManager also allows users with the correct privileges to configure local or networked DataManagers. You can configure the database while FMDataManager is active and fully operational, as On-line Configuration does not interfere with normal real-time database functions.

Alarms

Alarms can be set in FuelsManager that essentially compare a current database value against preset conditions. If an Alarm is defined for a database value, the comparison is be made each time the value changes. Each Alarm has an associated priority that may be indicated by a distinctive audible tone and color, and user access to alarm groups may be restricted through the Security setup.

All alarms, returns to normal, and acknowledgements are automatically logged to a daily alarm and event log disk file and the system can be configured to automatically generate a printout. Refer to chapters on FuelsManager Configuration and Reports for further Alarm and Security information.

Events And Event Logging

Events are based on changes to a database value by a defined amount or by operator command. All Events are automatically logged to a daily alarm and event log disk file and can be configured to automatically generate a printout to a specified printer.

Trends

Trends present data in a time-versus-magnitude format simulating a conventional strip chart recorder.

On-line Help

Several forms of Help are provided to maximize operator proficiency. User-defined Help files may be created and then linked to graphics displays and alarms. Client Applications

The FuelsManager client applications include:

- FuelsManager Configuration
- Operate
- Report
- Draw

FuelsManager Services

FMSystemManager

FMSystemManager performs master initialization and scheduling for the FuelsManager System. It starts up the previously mentioned server programs on its local machine. In addition, it provides shared system resources (Coded Variables, Modifiers, Engineering Units Strings, Products, Graphic File Names, Help File Names, and up to 16 sets of User Defined String tables) and services that are used by all FuelsManager programs.

Each machine contains FMSystemManager, which must be started before any other FuelsManager program. FuelsManager can be set up to start FMSystemManager manually or as a service. When started as a service, FMSystemManager automatically starts when Windows opens. It also executes under the SYSTEM account, so it is not necessary for a user to be logged into the system for FMSystemManager to execute.

System Start-up

After loading and initializing the shared system resources, FMSystemManager then starts up programs such as FMDataManager, FMCommManager, ArchiveManager, and ReportManager. The selection of programs depends on the local FuelsManager configuration. The startup mode of each program can be configured using the FuelsManager Configuration application.

System Shutdown

Shutting down FMSystemManager closes all FuelsManager programs such as the FMDataManager, FMCommManager, ArchiveManager, and the ReportManager.

System Resources

As mentioned previously, FMSystemManager manages certain system resources that are maintained in files. These files may be managed independently on each computer or cooperatively for a network of computers. The SERVER value under HKEY_LOCAL_MACHINE\Software\FuelsManager in the registry controls this functionality. System Manager accomplishes this by using either Independent system files or Master system files.

Independent System Files

By default, the local computer independently maintains all system resource files. The SERVER registry key contains the local computer system name. Configuration changes are applied to the local files and are not visible to other FuelsManager stations on a Local Area Network (LAN).

The default ‘Independent’ method is normally used for single computer FuelsManager systems. This method is also used when interconnected systems are using different languages or when

the client computer is connected to the main FuelsManager system using low-speed serial communications.

Master System Files

Under this method, a master server maintains multiple computer systems. The SERVER registry key contains the master server's computer name. All configuration changes to shared resources are directed to the master server instead of the local system.

During start-up, the FMSystemManager on each FuelsManager computer loads system files. If the registry designates another computer as the server, a link to the server is established so that all changes to the system shared resources are updated on the local computer. If the local computer is the master system server, additional functions are used to transmit changes to all Client computers. Maintaining local disk images of shared resources ensures that a viable image of all shared resources is available even if the designated server is temporarily unavailable. Any changes to shared resources are automatically updated to local storage when the server is available.

DataManager

The FMDataManager service maintains real-time process data and provides highly efficient, event-driven communications with other FuelsManager programs for data acquisition.

DataManager functions

- Provides security functions to limit user interaction with the database based on Windows XP and FuelsManager Configuration Accounts
- Provides the means to create and modify the system database
- Updates data values upon requests from the FMCommManager or the user interface programs
- Performs functions to detect and report alarms and events related to changes in the database
- Performs database calculations based on changes to the database.
- Performs Server functions to provide process data upon request from the user interface programs and FMCommManager. Real-time data can be provided to other FuelsManager or third party programs using industry standard protocols

Database storage

Process data is stored in a real-time data array. Each real-time data value entry includes the current value, time stamp, and status. Each process data item is associated with a point and each point within the database is assigned a unique name of up to four fields.

Database time

For data received from an FMCommManager, the time stamp is established when data is received from the field device. For values calculated in the database, the database time stamp is based on the latest calculation. The format is expressed in seconds and milliseconds and is stored in Greenwich Mean Time. This time is available for assignments in graphics and reports and is also viewed in the Operate program. All displays and reports correct to local time.

CommManager

This program controls communications with all field instrumentation and provides updated process data to the FMDataManager. The CommManager acquires data from remote devices and communicates this data to FMDataManager. The CommManager also loads, initializes, and supervises individual device interface modules.

CommManager Functions:

- Allocates hardware ports to devices based on system configuration
- Loads and manages interfaces based on configured field devices
- Performs hardware configuration, protocol translation and data conversion functions required to support the device. These functions may also include downloads and uploads from the field device
- Converts device data from all field devices for transmission to the FMDataManager. The CommManager may poll the field devices or accept unsolicited data from the devices based on device capabilities Translation may include simple data type conversion, engineering units' conversion, or more complex calculations such as tank calculations
- Relays information from the device to the FMDataManager upon changes to device dynamic data
- Transmits data to field devices by processing output requests from the FMDataManager

ReportManager

This program controls the scheduling of reports according to the print times specified when each report is created. Alarm/Event reports are categorized into Alarm Groups. Each Alarm Group is scheduled to print at a specific time and interval. If no alarms or events occurred within the interval, a report will still be printed indicating that no alarms or events occurred during the interval.

ArchiveManager

This program controls the extraction of information from FMDataManager and stores it to an alternate data source, usually a third party ODBC compliant relational database.

FuelsManager Applications

FuelsManager can be configured and maintained through several Windows-based user applications: FuelsManager Configuration, Operate, Draw and Report.

FuelsManager Configuration

The FuelsManager Configuration application is used to configure, maintain, and administrate all FuelsManager specifications such as real-time database configuration and device communications.

The FuelsManager Configuration application is for top-level users such as administrators and maintenance personnel, and is used for administration of the FuelsManager application suite.

You can define start-up options, access, define resources, configure the database points and alarms, configure or maintain the FMDataManager and CommManager. Security can be accessed to set up users and groups, and control data access. FuelsManager Configuration also provides access to the Operate, Report, and Draw applications from the User Interface menu.

The FuelsManager Configuration application appears as a window containing a menu bar:

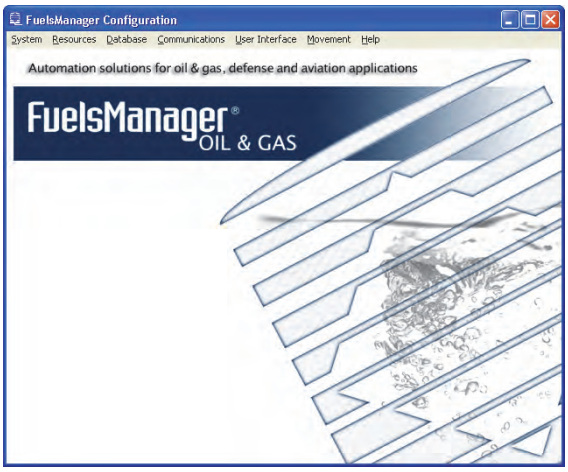


Figure 1-1: FuelsManager Configuration window

Operate

The FuelsManager Operate application allows an operator to track and monitor and/or control all activity and product movements.

The Operate program is intended for operations personnel, and can be configured with a login script to start automatically upon user log. The Operate program lets the operator interact with the facility during run-time. It provides dynamic interaction with the FuelsManager database. In Operate, the operator can monitor and control equipment through the use of real-time graphics, reports, and other windows.

The operator can also manage alarms and view trends. Other functions may include monitoring database points and responding to data by issuing commands. Refer to the FuelsManager Oil & Gas User Manual for more information.

Draw

Graphics are color graphic images that show the dynamic status of the system. The Draw application lets you create new graphics and symbols or edit existing graphics and symbols for use with the The Operate program.

Your FuelsManager system package contains several predefined graphics used to monitor and control the facility.

FuelsManager includes a program called Draw. With Draw you can create and modify graphics. When opened in the Operate program, these graphics display the real-time data of the selected points. The Draw toolbar is shown below. Refer to Chapter 10 for more information.

Report

FuelsManager provides the Report program, which controls all printing functions. The Report program lets users define new reports or edit existing reports that display real-time values or events.

Reports may be configured to print on demand, at a specific time or periodically. In the Operate program, you can view, print, and save these on-screen reports.

Your FuelsManager package may contain several predefined reports. Refer to the Report chapter for more information.

Selecting Remote FuelsManager Systems

The FuelsManager interface allows you to select other available FuelsManager databases on the network. This gives the ability to remotely configure systems over a network.

This can be done from many different dialogs within FuelsManager. Whenever you see a System button, or a Select button within a System or System Name group, you can select a different database.

Figure 1-2: System Name selection

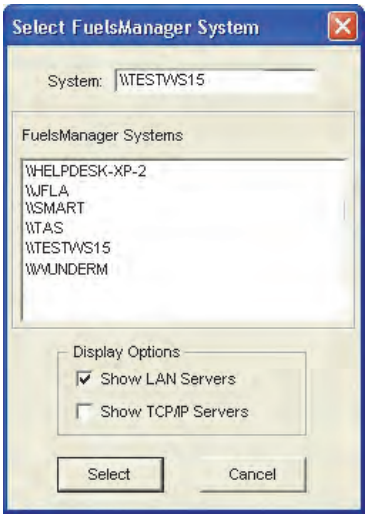


Figure 1-3: Select FuelsManager System dialog

2 Configuring Security

Microsoft Windows and FuelsManager Security

FuelsManager security extends the Microsoft Windows security model by providing additional security privileges specific to the process of fuels management. FuelsManager security allows you to:

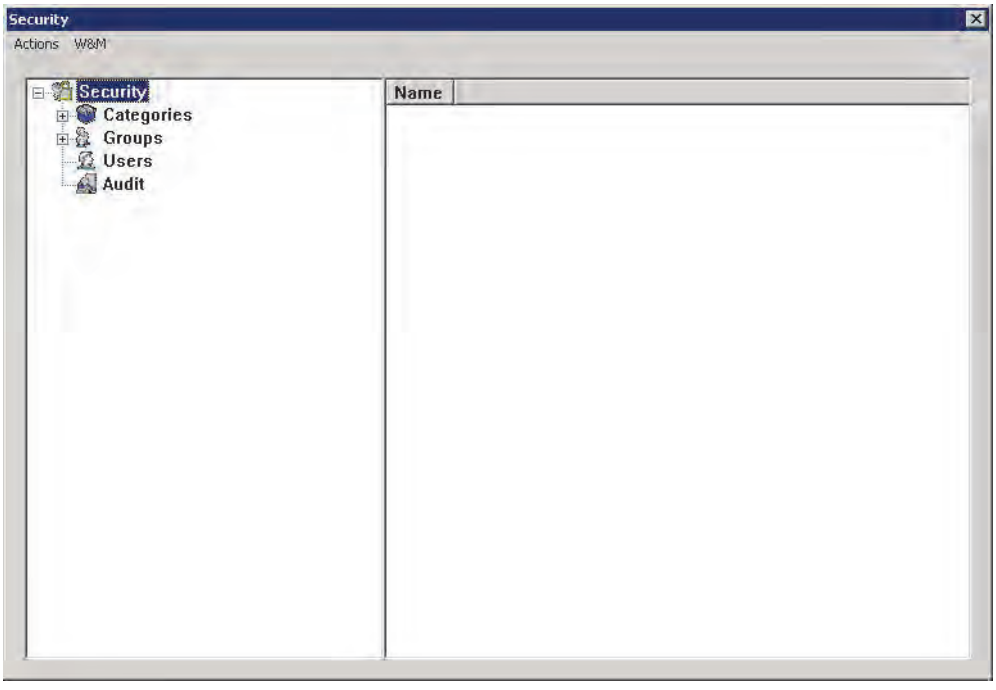
- Create users and user groups.
- Assign appropriate security privileges to user groups.
- Create alarm categories to manage which alarms get annunciated to specific groups of users.
- Create tag categories to manage which database points are accessible to specific groups of users.
- Set up an optional audit trail to assist in monitoring configuration changes made by users.

> Note All FuelsManager users must be defined as Windows users on the system running the application. If users are not set up, refer to the appropriate Windows documentation prior to setting up FuelsManager security.

Administrators have a centralized security model where they can designate which system(s) users can access easily.

Opening the Security Window

1. In the FuelsManager Configuration window, click Security.
2. Select Security. The Security window opens and is shown below.



The security window has two menu options when it is open:

- Actions
- W&M

Actions Menu

The Actions menu includes the options to add, delete, rename, properties or close. Some options appear only when appropriate depending on previous selections.

Option	Description
Add	The Add command allows the administrator[1] to add a user, group, tag, or an alarm according to what section is selected in the security window.
Delete	The Delete command allows the administrator[1] to delete a user, group, tag, or an alarm according to what section is selected in the security window.
Rename	The Rename command allows the administrator[1] to rename a user, group, tag, or an alarm according to what section is selected in the security window.
Properties	The Properties command allows the administrator[1] to define the properties of a user, group, or an alarm category according to what section is selected in the security window.
Close	The Close command will close the Security window completely.
[1]Administrator or any user with the Configure Security permission enabled	

Categories

FuelsManager provides two types of categories:

- Alarms
- Tags

Categories allow the administrator to set access and permissions at a group level. Groups may be used to designate a physical location, such as Control Room A and Control Room B. Groups can also be used to set access and permissions for job titles, such as Supervisor or Operator.

Note An individual can belong to only one category.

Alarm groups designate which alarms a particular user group receives. In addition, the administrator can designate which printer prints a particular alarm category. For larger systems, it is important to categorize alarms so that only users with responsibility for a particular area of the facility are notified of alarms for that area. For instance, you do not want Control Room A to receive alarms for Control Room B.

Tag categories allow the administrator to further segregate the FuelsManager system by defining which database points a particular user groups can see. Once defined, the administrator can deploy a system with a central database containing all tanks for the entire

facility, but then segregate the tanks based on logical areas of plant, such as West Tank Farm, East Tank Farm, and Docks).

> Note This process of defining which database points are in which alarm/tag category takes places as part of database configuration and is detailed in the Database section.

FuelsManager allows the creation of up to 32 alarm and 32 tag categories. Once defined alarm and tag categories are assigned to a user group, under the Access branch, and only users in those groups have access to the tags in the categories. Categories can be assigned to more than one group, allowing an overlapping of alarm and tag categories. From our example above, we created categories for West Tank Farm, East Tank Farm and Docks – typically these might be assigned to user groups of the same name. We could then create another user group called Managers and assign all three categories to this group. Using the categories and tags, the Managers user group would be able to see all tanks across the entire facility.

Working with Alarm Categories

Alarms can have a defined report manager, printer, start time, print interval, and the choice to enable the print.

> Note The Name column can be sorted by clicking the Name column heading. An A indicates the column is sorted in ascending order, a D indicates the column is sorted in descending order.

Creating, Deleting or Renaming Alarm Categories

Use this example to Create an alarm, but you can also follow the instructions to delete or rename an alarm.

1. Click to expand the Categories tree.
2. Select Alarm under the Categories.
3. From the Actions menu select the Add command.
4. Enter the name of the alarm.
5. Close the Security window.

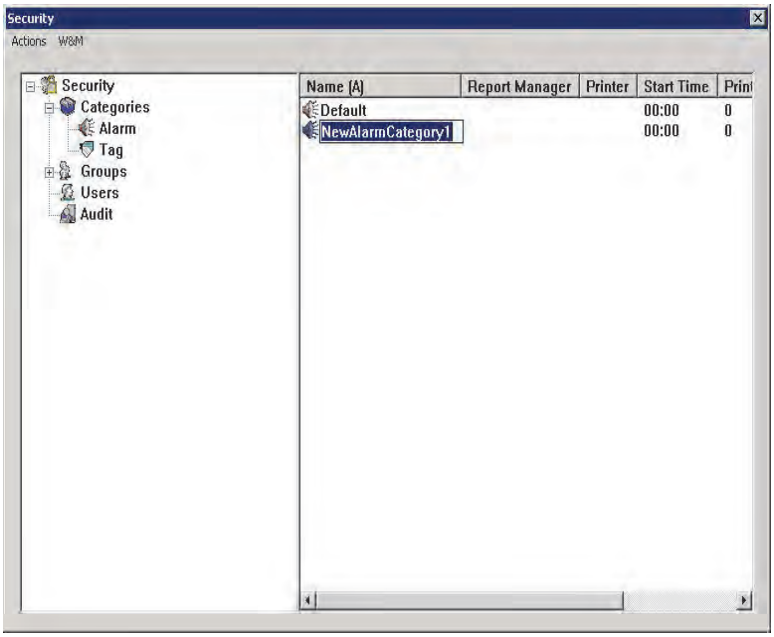


Figure 2-1: The security window

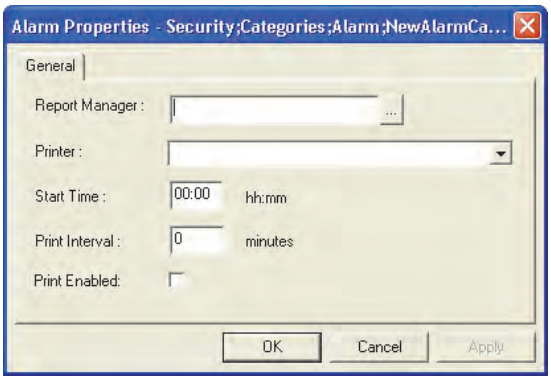
Defining Alarm Category Properties

The properties of the alarm category define which server will be used to print alarms for this category and printer settings, such as print time and print intervals.

1. Click to expand the Categories tree.
2. Select Alarm under Categories and click on the category name from the right window to define its properties.
3. From the Actions menu select the Properties command.
4. The Properties window appears.
5. Enter in the name of the server or click on the button next to the Report Manager box to browse for servers.
6. Select a printer using the list box or by typing in the name of printer.

   Note In previous years, a printer with fan-folded perforated sheet paper was used to print alarms, one per line, as they occurred. With the advent of laser printers, printing every alarm as it occurs may use a sizable amount of paper. Therefore, Varec recommends setting a start time and print interval to print alarms.
7. In the Start Time field, enter the time of day that the alarms in this category should print. Or in the Print Interval field, enter the number of minutes between periodic printings of alarms in this category.
8. Select Print Enabled to activate alarm printing.
9. Click OK or Apply to have the properties stored for the alarm.
10. Close the Security window.

Use the Start time Field in conjunction with the Print Interval field to synchronize what time periodic print outs will occur. For example, set Start Time to 00:10 and print interval to 60 minutes to have alarms for the category printed.



Alarm Properties window can be used to create delete or rename Security Alarm settings.

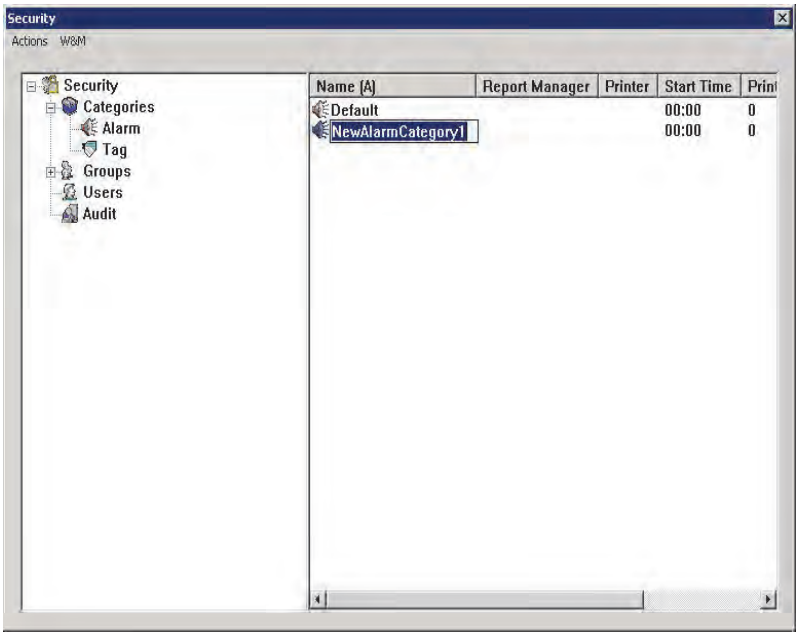
Creating, Deleting or Renaming Tag Categories

This example deletes a Tag Category, but you can also follow the instructions to Create or rename a Tag.

> Note The Name column can be sorted by clicking the Name column heading. An A indicates the column is sorted in ascending order, a D indicates the column is sorted in defending order.

To delete a tag

1. Click the plus (+) next to Categories to expand the tree structure.
2. Select Tag under the Categories.
3. Click the tag name that is to be deleted from the Tag listing.
4. From the Actions menu (or right-click), select Delete.
5. Close the Security window.



The Security window can be used to create delete or rename Security Tag settings.

Users and Groups

FuelsManager follows a user and user group security model. All users belong to a group. The groups dictate the permissions the user has. The system administrator creates the groups and assigns privileges to allow or restrict the specific FuelsManager features for that group. The administrator then assigns users to these groups.

Users are only allowed to belong to one user group.

By default FuelsManager provides two pre-configured user groups: Operator and Administrator. You can create new user groups to build a security model that matches the needs of the particular facility.

> Note To be added to FuelsManager the user must also exist as a Windows user. The particular Windows user group and permissions assigned to that group do not matter.

In addition to defining which categories the user group can access (see above), the administrator can control the specific system features a user group has permissions to use. These privileges are divided into two sections:

- System permissions – these apply to the overall FuelsManager system and control general access to features, such as configuring the database.
- Tag permissions – these apply to defined tag categories and control access to features specific to a database point, such as setting the level high-high alarm limit or executing a gauge command.

> Note A complete list of system and tag permissions is provided later in this section.

Creating and Editing Users

User accounts can be created in the Security window. Once the FuelsManager user account is created, the user can then be added to a User Group. Furthermore, the administrator can delete, rename or define properties for the user.

> Note The Name column can be sorted by clicking the Name column heading. An A indicates the column is sorted in ascending order, a D indicates the column is sorted in descending order.

Creating, Deleting or Renaming a User

1. Click on the Users icon to display a list of users in the right side window.
2. This list contains all the FuelsManager users and their corresponding groups. FuelsManager is capable of supporting fifty (50) different users.
3. From the Actions menu, select the Add command.
4. Enter the case-sensitive user name, as it appears in Windows.
5. Close the Security window.

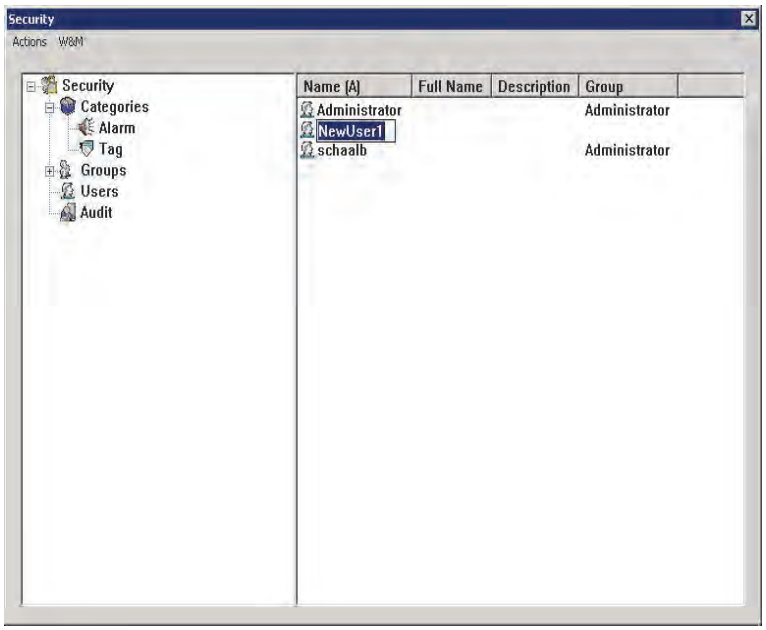


Figure 2-2: The security window: Action menu

Note To select multiple users simultaneously, use the <Ctrl> key in conjunction with the mouse to select the users you want to add or delete.

Defining User Properties

Further details for each individual user can be added through the Properties window. This allows the entry of the user's full name and other details to help describe the user.

Note The properties that are defined within the FuelsManager program are not linked to any of the user information defined in the system. Refer to your Windows documentation for further instruction.

To add user properties:

1. Click on the Users icon to display a list of users in the right side window.
2. Select the user you wish to modify from the User list.
3. From the Actions menu select the Properties command.
4. The User Properties window appears.
5. Type in the user's Full Name and Details in the corresponding fields.
6. Click OK or Apply to apply changes.

Creating and Editing User Groups

Creating, Deleting or Renaming a Group

After the group has been created; users, permissions, alarms, and tags can be modified for the group along with deleting and renaming the group. In this example we Rename a Group, but you can also follow the instructions to Create or Delete a Group.

Note When a new group is created, the permissions default to Operator group rights.

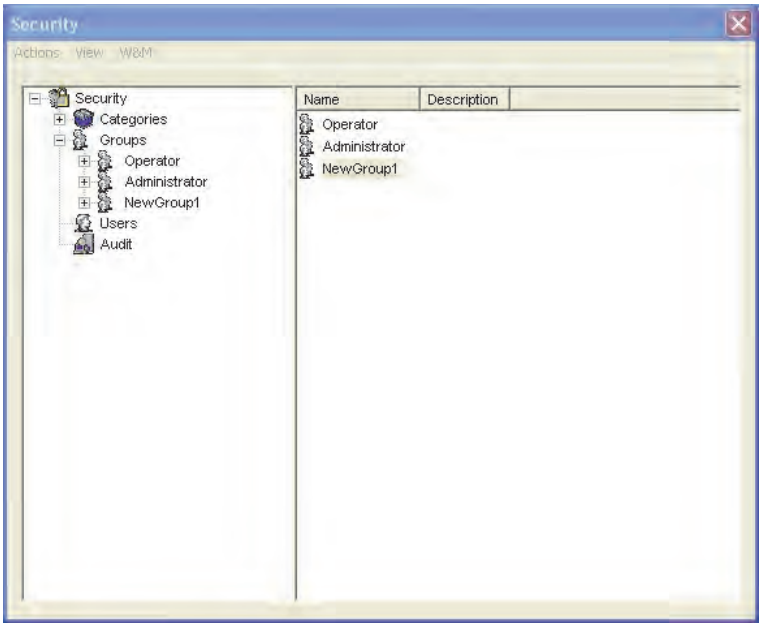
Note The Name column can be sorted by clicking the Name column heading. An A indicates the column is sorted in ascending order, a D indicates the column is sorted in descending order.

To create a group:

1. Click on Groups icon.
2. Click on the group name that is to be renamed in the Groups listing.
3. From the Actions menu select the Rename command.
4. Enter a new name for the Group.
5. Close the Security window.

The groups within FuelsManager are Not linked to the groups in Windows XP or 2000.

The security window can be used to create delete or rename Security Group settings



Adding Users to a Group

Note A user can only belong to one group.

A user can be added to a group after the group is defined. A user does not have to already exist under the Users option in order to be added to a group. When the user is added to a group, the user name is automatically added to the list under Users.

To add a user

1. Click on the + next to the Groups icon to expand the tree structure.
2. Click on the group name that the user will be added to.
3. From the Actions menu select the Add command.
4. Enter a name for the new user.
5. Close the Security window.

Access

Alarm and Tag Selection

In this example, we assign alarm categories to a Group, but you can also follow the instructions to Assign Tag categories to a Group.

1. Click on the + next to the Groups icon to expand the tree structure.
2. Click on the + next to the group name under the Groups icon.
3. Click on the + next to Access under the group name.
4. Click on the Alarm icon under the Access expanded tree structure.
5. In the right side window click in the check box next to the alarm categories that the group will have access to.
6. A check next to the alarm name indicates that there is access to the alarm. If there is not a check mark next to the alarm, the group will not have any access to the alarm.
7. Close the Security window.

System and Tag Permissions

In this example, we modify the System permissions for a Group, but you can also follow these steps to modify Tag permissions for a Group.

To modify system permission for a group:

1. Click on the + next to the Groups icon to expand the tree structure.
2. Click on the + next to the group name under the Groups icon.
3. Click on the + next to Permissions under the group name.
4. Click on the System icon under the Permissions expanded tree.
5. In the right window, check or uncheck the permissions as required.
6. Close the Security window.

System Permissions

The table below contains a list of the system permission and the corresponding description.

System Permission	Description
Acknowledge Local Alarms*	Respond to alarm activity in the Operate program from a local system.
Acknowledge Remote Alarms*	Respond to alarm activity in the Operate program from the remote server.
Add Database Points	Capable to add database points. Must have Configure Database permission.
Browse Database*	Browse the point database in Operate to define, open, or restore any point variable to monitor. (Defines whether you can access the Point menu bar option). Must have Configure Database permission.
Communications Maintenance*	Configure the communications maintenance, including monitoring, enabling, and disabling communications using FuelsManager Configuration > Communications > Maintenance.

System Permission	Description
Configure Alarm Categories	Configure Alarm category within security.
Configure Alarms	Configure global alarm definitions in FuelsManager Configuration > Database > Alarms.
Configure Archivemanager	Configure Archive Manager Services for start times, intervals, and historical periods for data to be archived.
Configure Auditing	Configure Audit permissions.
Configure Communications	Configure the CommManager Services only for the interface device, description, and communication port.
Configure Database	Configure the database. These changes are instantly configured into the database.
Configure Graphics*	Configure any graphics, run Draw > FuelsManager Configuration > Draw Graphics.
Configure Groups Format	Modify the format of existing tank group displays (add, delete, insert and modify columns; select column units; set column headings; add tanks; remove tanks; set tank data).
Configure Groups*	Configure the tank groups within Operate. Also, create, delete, and modify tank templates.
Configure Historical Trend*	Configure the historical trend data for the graphical display of the trend and of what points to graph.
Configure Leak Detection	Configure the Leak Detection operations in FuelsManager Configuration.
Configure Macros*	Create (Record) and Delete macros using Operate > Tools > Macro.
Configure Movement History Data	Ability to edit movement history data.
Configure Movement History Data Table	Ability to change the appearance of the movement history screen, such as resize, reorder, add, and delete columns.
Configure Movement View	Modify the format of the existing summary, (add, delete, insert and modify columns; select column units; set column headings).
Configure Movements*	Configure new product movement paths via the Operate program. Without this user right, all new movement paths must be configured using the FuelsManager Configuration application.
Configure Operate UI	Ability to change the appearance of operate components, such as modifying columns on the alternate alarm line, icon size on tool bar and the ability to dock or undock navigation pane.
Configure Realtime Trend*	Configure the real-time trend data for the graphical display of the trend and what points to graph using Operate > Display.
Configure Reports*	Configure any reports using FuelsManager Configuration > User Interface > Create Reports. Note The reports created using Configure Reports are real-time reports. Historical reports are configured using Crystal Reports.
Configure Security	Configure Categories, Groups, Users, and Audit.
Configure Start Definitions	Configure start definitions within the resources menu to define shortcuts to external applications using FuelsManager Configuration> Resources > Start Definitions.

System Permission	Description
Configure Startup Options	Configure Startup Options using FuelsManager Configuration > System > Startup Options to set the sub-systems are active, standby, or shutdown. Also, set the Project Directory, Default Tank Detail directory, Graphics Directory and the Reports Directory.
Configure System Resources	Configure the products, strings, coded variables, modifiers, translations, and help file names resources.
Copy Database Points	Capable to copy database points. Must have Configure Database permission.
Delete Database Points	Capable to delete database points. Must have Configure Database permission.
Edit Database Points	Capable to edit database points from original content. Must have Configure Database permission.
Execute Macros*	Execute existing macros using Operate > Tools > Macros.
Execute Start Definition	Execute start definitions in Operate under the Tools menu.
Global Silence Audible*	Silence all alarms on all clients of the system.
Graphics Access*	Allow Operate program to open up different graphics to display.
Import/Export	Capable to Import/Export alarm groups from different data-bases. Must have Configure Database permission.
Override Database Value	Allows the operator to override a calculation or field input values with FRC superscripting when Display Quality data is enabled.
Print Display*	Configure the capabilities to print the display using Operate > Display.
Rename Database Points	Capable to rename database points. Must have Configure Database permission.
Run Leak Detection Tests	Run Leak Detection tests on your tanks using the settings that exist in the Configuration.
Setup Movements*	Configure new product movement paths via the Operate program. Without this user right all new movement paths must be configure via the FuelsManager Configuration application.
* Permissions that are set as the default for the operator group.	

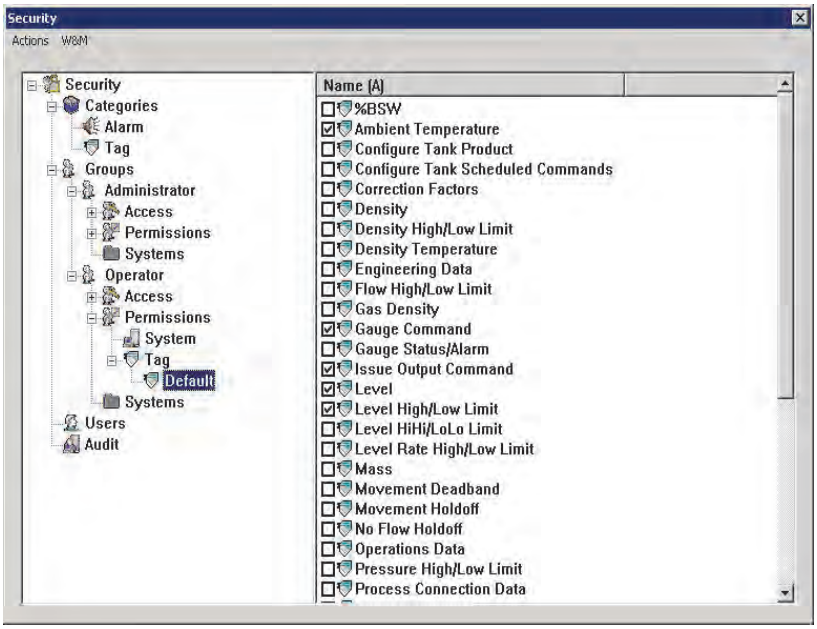


Figure 2-3: The security window showing a list of permissions

Permissions that are set to the default for the operator group are marked with an asterisk (*) in the table below.

User Privilege	Definitions
%BSW[1]	Allows you to enter the percentage of Bottom Sediment and Water
Ambient Temperature[1, 2]	Allows you to enter ambient temperature
Configure Tank Product	Allows you to change the product in the tank
Configure Tank Schedule Commands	Allows you to change the tank command schedule on the bottom of the tank point vessel 2 tab.
Correction Factors	Allows you to enter correction factors
Density High/Low Limit	Allows you to set the density High or Low alarm limit
Density Temperature[2]	Allows you to enter the density temperature
Density[1, 2]	Allows you to set the density of the product
Density High Low Limit	Alows you to set the Density High and Low alarm setpoints
Engineering Data	
Flow High/Low Limit[1]	Allows you to set the flow High or Low alarm limit
Gas Density[1, 2]	Allows you to enter the gas density
Gauge Command[1]	Allows you to send a command to a gauge or serve
Gauge Status/Alarm	Allows you to override the feedback from a servo device
Issue Output Command	
Level High/Low Limit[1]	Allows you to set the level High or Low alarm limit
Level HiHi/LoLo Limit	Allows you to set the level HiHi or LoLo alarm limit
Level Rate High/Low Limit[1]	Allows you to set the level rate High or Low alarm limit
Level[2]	Allows you to set the level in a tank
Mass[2]	Allows you to set the mass of the product

User Privilege	Definitions
Movement Deadband[1]	Allows you to set the amount the tank level is allowed to change before alarm notification
Movement Holdoff[1]	Allows you to set the number of seconds before the movement alarm notification
No Flow Holdoff[1]	Allows you to set the number of minutes before the no flow alarm notification
Operations Data	
Pressure High/Low Limit	Allows you to set the pressure High or Low alarm limit
Process Connection Data	Allows you to edit the process connections in the tank point Process Data tab
Rates[2]	Allows you to set the flow rate or level change rate of the product
Reverse Flow Holdoff[1, 2]	Allows you to set the number of seconds before the reverse flow alarm notification
Solids Level[1, 2]	Allows you to enter the solids level
Standard Density[1, 2]	Allows you to enter the standard density
Tank Mode[1]	Allows you to change the tank mode, either emptying, filling, or stopped
Tank/Transfer Status	Allows you to set the tank or transfer status of a tank
Temperature High/Low Limit[1]	Allows you to set the temperature High or Low alarm limit
Temperature HiHi/LoLo Limit	Allows you to set the temperature HiHi or LoLo alarm limit
Temperature[2]	Allows you to set the temperature of the product
Transfer[1]	Allows you to use transfer mode, this is disabled if you have the movement system
Vapor Pressure[2]	Allows you to enter vapor pressure
Vapor Temperature[2]	Allows you to enter vapor temperature
Volume Correction Data	Allows you to set the VCF factor or change the volume correction method
Volumes[2]	Allows you to set the volume of the product
Water Level[1, 2]	Allows you to enter the water level
[1]Permissions that are set as the default for the operator group	
[2]Operator can change values in manually entered fields if the group system permission Override DB Input is enabled	

Audit

The FuelsManager audit feature allows the administrator to track when and by whom configuration changes are made. Once enabled, changes made to the audited parameters are logged to the Windows Event log under a FuelsManager specific log called FM Audit. The audit log is useful in tracking down what parameters have been changed when diagnosing a problem. FuelsManager provides the ability to turn audit logging on and off for six areas of configuration data.

Note It is recommended that the audit log only be enabled after FuelsManager configuration is complete. Enabling this feature during configuration results in many useless log entries.

Reviewing the Event Log

To review the event log:

1. Open the Windows Control Panel from the Settings menu.
2. Select Administrative Tools.
3. Select Computer Management.
4. Click on the + next to System Tools to expand the tree structure.
5. Select Event Viewer.
6. Select FM Audit.

Audit Categories	
Changes to Tag Configuration	Monitor and record any changes made to the configurations of any tag
Changes to Group Permissions	Monitor and record any changes made to the permissions of any group
Changes to Users	Monitor and record any changes made to the list of Users
Changes to Groups	Monitor and record any changes made to the list of Groups
Changes to W&M Calibration Seals	Monitor and record any changes made to the W&M Calibration Seals
Changes to W&M Module Seals	Monitor and record any changes made to the W&M Module Seals

Security Authentication

During normal operations, the client system manager downloads a copy of resource host files from the System Manager host which includes, security, products, alarm definitions, and so on. The client normally does not use the copy if the connection to the resource host is maintained.

If that connection is broken between the client system manager and the resource host system manager, operations continue with the client system using the downloaded copy of the host files. When the connection is re-established, the client updates the resource host system. This operation is transparent to the user.

3 Setting System Parameters

Working with Configuration

Top-level users such as administrators, system engineers, and maintenance personnel use the Configuration application to configure and control the FuelsManager system.

Configuration and control features include defining start-up options, FuelsManager users, system resources, and configuring database points, alarms, and field device interfaces. Other features include maintaining field communications and accessing the Operate, Report, and Draw applications.

Opening Configuration

1. From Windows, click Start and select Programs.
2. Select FuelsManager folder.
3. Select Configuration.
4. The FuelsManager Configuration application window appears.

Figure 3-1: FuelsManager Configuration window

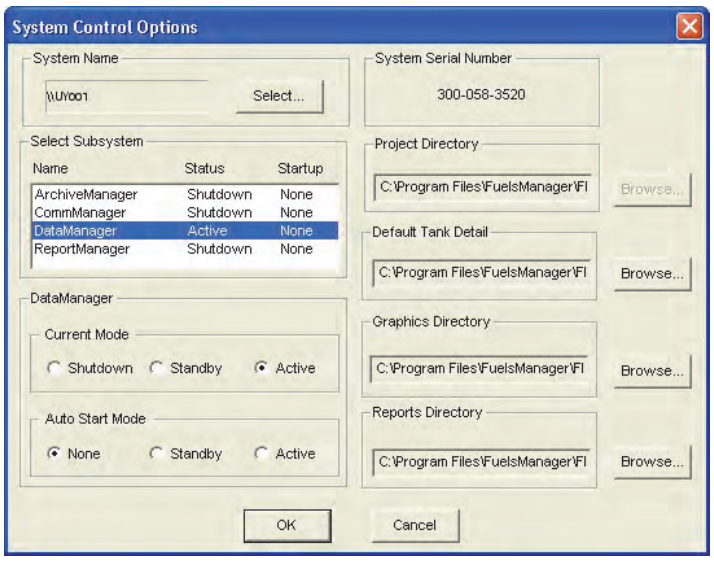
Exiting Configuration

1. From the System menu select the Exit command.
2. The Configuration window closes.

Setting Subsystem Run Modes

Note Setting subsystem run modes must be done after a new installation. The system defaults everything to shutdown and none.

This section lets you start and stop the different FuelsManager services. It also lets you set which of these services should automatically start when FMSystemManager starts.



System Selection

> Note The Select FuelsManager System dialog only displays active FuelsManager installations. If your system is not listed, make sure the appropriate 'manager' is active.

FuelsManager Configuration can be used to configure the local FuelsManager application or a remote FuelsManager on the LAN or WAN. Nearly all FuelsManager Configuration dialogs contain a System Name field and a Select or Browse button that allows you to pick which FuelsManager system is to be configured. In this case, you can select a different server on the network by clicking Select, which opens the Select FuelsManager System dialog. Then choose a different system and click Select.

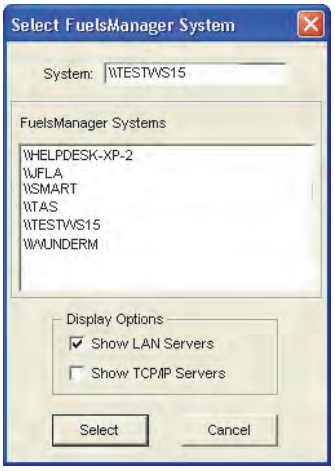


Figure 3-2: Select FuelsManager System window

Current Mode

The Current Mode options let you change the current operating mode. Selecting Shutdown, Standby or Active immediately changes that subsystem's mode

Auto Start Mode

Note You can also select the directories the system uses to store and access FuelsManager files. These selections are described in the Setting Up FuelsManager File Directories.

The Auto Start Mode option allows you to select an automatic startup mode for each of the subsystems. You can select None, Standby or Active. For example, suppose Active is selected for the FMDataManager. If FuelsManager shuts down and then restarts, the FMDataManager starts up in the Active mode.

If a remote system is selected, the Startup Options window displays the defined attributes of that system. Selecting a different system only allows you to set the system options; this does not change the local FuelsManager Configuration application.

Shutdown Mode	Effect
ARCHIVEMANAGER	The system is not archiving data into the ArchiveManager database
DATAMANAGER	User cannot configure the system database
COMMMANAGER	User cannot configure the communication interface. Any associated I/O points are not available for data transfer to or from the database
REPORTMANAGER	Reports cannot be opened in Operate program. Report is still enabled for creating and editing reports

Standby Mode	Effect
ARCHIVEMANAGER	The system is not archiving data into the ArchiveManager database, just like Shutdown Mode
DATAMANAGER	Database is available for configuration. Cannot configure for real-time data
COMMMANAGER	CommManager and all of its interfaces are available for configuration. All interfaces are forced into this mode. Cannot configure for field data
REPORTMANAGER	Reports are available for configuration. Reports can be opened in Operate program

Active Mode	Effect
ARCHIVEMANAGER	The system archives data into the ArchiveManager database
DATAMANAGER	Real-time data is available to all subprograms and subsystems
COMMMANAGER	Data passes between the configured database point variables and the field device(s)
REPORTMANAGER	Reports are available for configuration. Reports can be opened in Operate program

FuelsManager file directories

The selected hard drive, subdirectories, and file contents vary according to your facility requirements.

Program directory (\Program Files\FuelsManager\)

The FuelsManager directory, which is not displayed in the System Control Options window, contains all the FuelsManager system files. The FuelsManager directory is always separate from the project directory and it is where the program was installed.

FM Project (\Program Files\FuelsManager\FMProject)

The FMProject directory is the main directory that stores all the project-specific files such as CommManager data, database definitions, strapping tables, and alarm definitions. This directory also contains the Graphic, Report, and other subdirectories.

Note The RTU, Strap, CSV support subfolders are not automatically created by FuelsManager. These folders are created by your Varec project engineer.

Subdirectory	Description
Archives	Contains Archival and Movement databases when using MS Access database type
CM_Data	Contains communication interface definitions
CSV	Contains exported configuration files
Detail	Contains all standard and custom tank detail graphics
Graphics	Contains all saved and generated graphic and seasonal files
Log	Contains all Alarm and Event logs
Reports	Contains all saved and generated report files
RTU	Contains RTU Configuration and DVR files
Strap	Contains all exported tank strapping tables
Support	Contains various other files used to configure your FuelsManager database
Templates	Contains template files for Bitmaps, Databases, example projects, Graphics, Reports and Symbols

FMTools

The FMTools subdirectory contains FuelsManager applications used to assist in the configuration of your database.

File	Description
Dmp.exe	Application used to create a diagnostic file detailing the FuelsManager application files and the installation environment
FMBakRes.exe	Application used to back up the FuelsManager configuration to a zip file or restore a configuration from a zip file. This requires Winzip to be installed on the machine
FMSim.exe	An OPC client application that can be used to simulate changing tank values--useful for testing and demonstrating purposes
FMSysConfig.exe	Used to rename a FuelsManager project that was developed on one machine name but needs to be transferred to a PC with a different name
FMSysUpdate	An offline utility used to upgrade FuelsManager database from previous versions to the current version

ViewRTU

The ViewRTU directory in FuelsManager serves as the installation directory of the ViewRTU software. It includes all ViewRTU system files, drivers and bitmaps.

Note Unless absolutely necessary, it is recommended that you keep the default file directories. This will assist Varec support staff in diagnosing any problems.

Setting up file directories

1. From the Configuration window, select System and click Startup Options.
2. Click the appropriate Browse button and navigate to the appropriate directory.
3. Repeat the previous step until all the fields contain the correct directory path details.
4. Click OK.

Defining System Resources

Resources utilized by FuelsManager are defined in the system resources within the FuelsManager Configuration application. Resources that can be defined are:

- Products
- Strings
- Coded Variables
- Modifiers
- Help File Names
- Start Definitions

Products

Product specifications are created, saved, edited and deleted using the resources command in the FuelsManager Configuration application. They are saved in the Product Index which can be accessed during database edit and then assigned to Tank points.

Creating a new product definition

1. In the Configuration window, select, select the Products command from the resources menu. The Product Configuration window appears.
2. Click Add to create a new a product code. The Edit Product Definition window appears.
3. Enter in the name of the product, description of the product, assignment options, correction method (if any), and temperature alarms (if any). The product name can be up to twenty alphanumeric characters and the description can be up to thirty alphanumeric characters.
4. Enter any appropriate Assignment Options for the product definition.
5. Click OK to save the product definition.

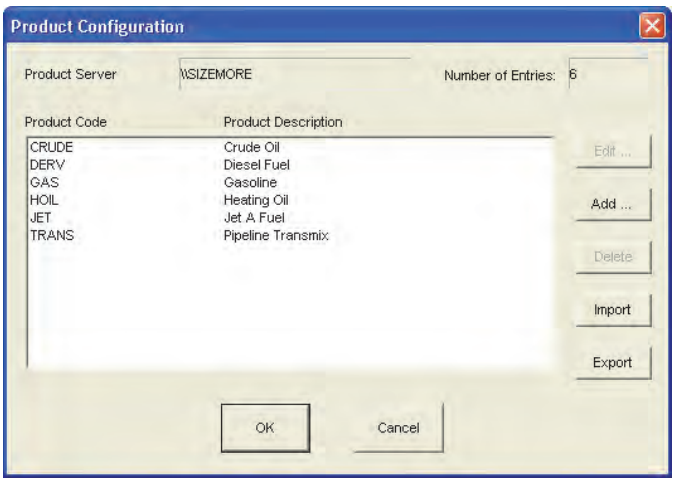


Figure 3-3: Product Configuration window

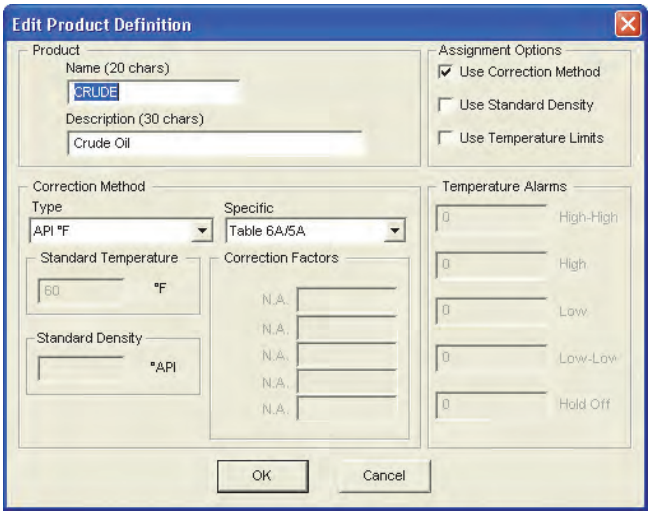


Figure 3-4: Edit Product Definition window

Assignment Options (Product)

In addition to the Name and Description of the Product Definitions, you can also set the product to use a Correction Method, Standard Density, and Temperature Limits. You can have different options for each Product.

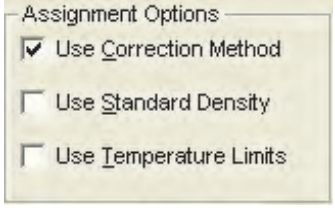


Figure 3-5: Product Assignment Options - Edit Product Definitions dialog

Selecting one or more of the options above ensures that when a Product is assigned to a tank point, the corresponding parameters are automatically applied to the tank.

Use Correction Method

Select the Correction Method checkbox when you want to use Correction Methods. This enables the Type and Specific list boxes. Select the Type of Correction Method you want to use, then select the Specific method. You may be required to enter additional data in the Correction Factors fields.

Use Standard Density

Standard Density lets you set the specific density that will be used for the Product. This enables the Standard Density field so you can enter the appropriate figure.

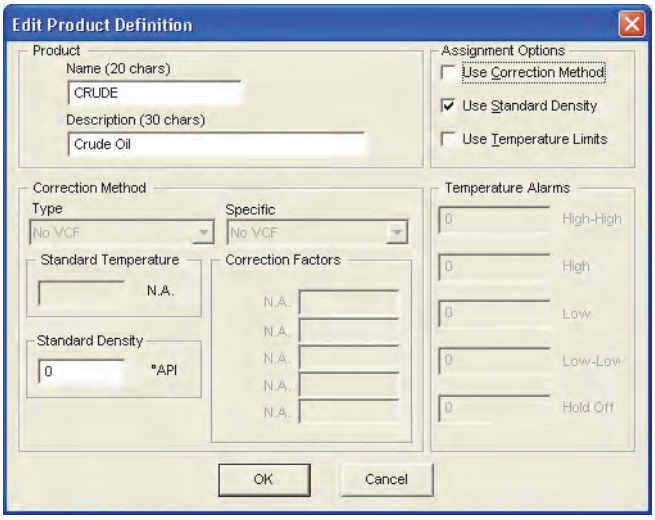
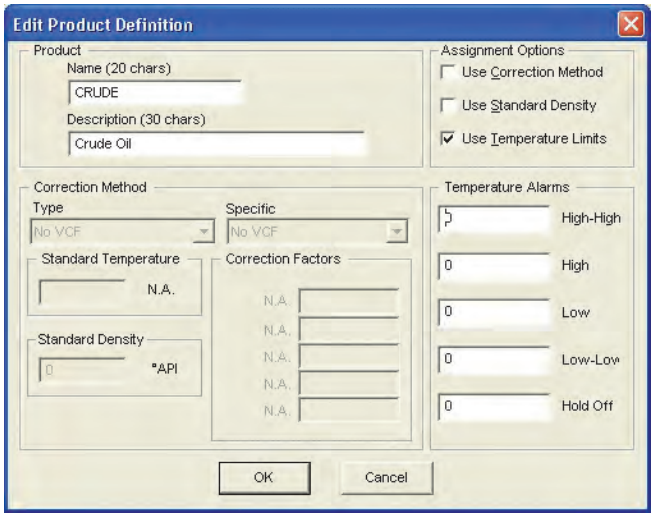


Figure 3-6: Edit Product Definition - Standard Density options enabled

Use Temperature Limits

Temperature Limits let you set specific temperature parameters. You can enter the specific temperature alarms that you want tied to the product.



Edit Product Definition – Temperature Limits options enabled

Importing/exporting product definitions

Product definitions can be imported or exported. Importing allows the use of product definitions previously defined, while exporting provides a backup of the product definitions. All files for importing and exporting are comma-delimited text files (*.csv).

To import or export a product definition

1. In the Product Configuration window, select Import or Export to import/export a product definition file.
2. The Choose a File to Import window appears or Export Products window appears.
3. To Import: Select the file to import in the corresponding directory, and then click Open.
4. To Export: Select the path to save the file to. Type in a name for the file and click Save.

Strings

User-defined strings are messages that may be used in the Operate program. These strings, or messages, can be used to instruct an operator to perform a specific task. FuelsManager provides you with the ability to create User-defined string types that may be assigned to Input and Output points.

For example, if an alarm becomes active, a message may be displayed instructing the operator to close a valve. User-defined strings can also be used to display advisory messages concerning equipment status. For example, a User-defined string may be used to display Client Names, Client Document Numbers, and Destinations.

The string appears as a data format type in the database. The User-defined strings are added to the bottom of the data format list. In the list, the first string type label is “USER0”. Each additional string type is labeled “USER1”, “USER2”, etc. The string type name appears next to the label.

There are no standard FuelsManager strings. All strings are user-defined. FuelsManager allows up to 16 unique User-defined string types.

Creating strings

1. In the Configuration window, select the Strings command from the Resources menu. From the Strings sub-menu select Add Type. The String Configuration window appears.
2. Enter the name of the user-defined type. Type in the maximum length of each string in the Maximum Length window and click Apply. This sets the maximum number of characters used in each string, which can be no greater than 80 characters and no less than 1 character.
3. Type the string in the Edit String window.
4. Click Append to add the string to the list. The string is added to the bottom of the current list.
5. Repeat the above steps to add more strings to the list. When all strings have been entered, click OK.

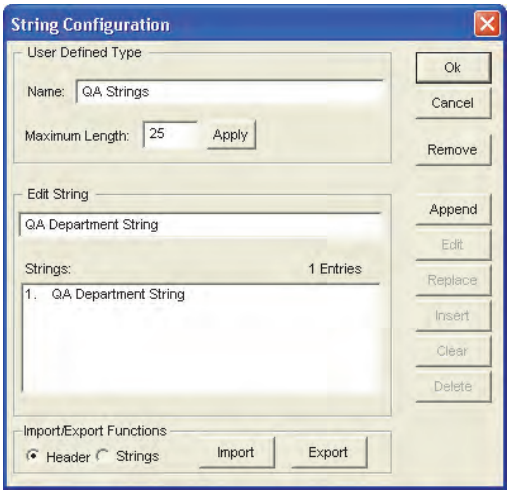


Figure 3-7: String Configuration window

Deleting or editing a string

Once a String has been defined it appears in the Strings sub-menu under the Add Type command.

1. In the Configuration window, select the Strings command from the Resources menu. From the Strings sub-menu select the user-defined string to be modified.
2. The String Configuration window appears.
3. Use the action buttons within the window to modify the string.

String configuration window	
APPEND	Adds the string in the Edit String text box to the end of the string list.
EDIT	Allows any of text of the current string selection in the Edit String text box to be modified.
REPLACE	Replace the current string selection with the text in the Edit String text box.
INSERT	Insert a new blank string above the selected string.
CLEAR	Clear the current string selection of any text.
DELETE	Delete the current string selection from the list completely.

Importing/exporting string information

User-defined strings can be imported or exported using comma-delimited text files (*.csv). The header and strings have to be imported/exported separately.

Importing strings

1. In the Configuration window, select the Strings command from the Resources menu. From the Strings sub-menu select Add Type. The String Configuration window appears.
2. Select either Header or String option button. The Header options button import header information (user-defined name and maximum length). The String option button imports the string (the list of strings for the user-defined type).
3. Click Import.

4. The Import User String Header or the User String table appears.
5. Select the file to import and click Open.
6. The String Configuration window displays the Header or String information imported.

Coded variables

Coded Variables are used for input and output processing as well as alarm processing. Coded Variables can be used to build alarms and to display process or equipment status on graphics and reports.

FuelsManager allocates the first 512 Coded Variables. These standard Coded Variables are used for FuelsManager processes and cannot be modified. The predefined variables include most common process control states including equipment status, alarm states, months of the year, and equipment commands.

If the list is not sufficient, you have the ability to create new Coded Variables. Once created, the Coded Variables are available for assignment in the database.

Creating a new coded variable

1. From the Resources menu in the Configuration window, select the Coded Variables command, the Coded Variables Configuration window appears.
2. Type in a coded variable name. The name can be up to 15 characters including any embedded spaces entered, then click Add.
3. The name appears in the list, click OK.
4. The Coded Variable is now available for database point assignment.

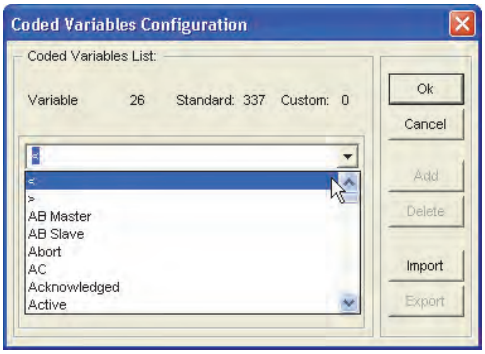


Figure 3-8: Coded Variables Configuration window

Coded Variables Configuration window

The Coded Variables Configuration window lists all the variables found in the system – standard and custom Coded Variables – and the quantity of each type. You are able to add or delete custom Coded Variables. Each Coded Variable is identified by a variable index number as indicated in the Coded Variables Configuration window.

Deleting a coded variable

1. In the Coded Variables Configuration window, select the variable to be deleted from the scroll box so that it appears in the edit box.
2. Click Delete. The coded variable is no longer a part of the list.

Importing coded variables

Note Standard Coded Variables cannot be deleted.

Custom coded variables are the only variables that can be imported or exported.

1. From the Configuration window, select Resources and click Coded Variables. The Coded Variables Configuration window appears.
2. Click Import.
3. The Import Coded Variables window appears.
4. Select the import file and click Open.
5. The system imports the file and returns to the Coded Variable Configuration window.

Modifiers

Modifiers are a collection of Coded Variables. Modifiers are used to group commands issued in the Operate application. For example, the “OPEN” and “CLOSE” command combination is one type of modifier.

The FuelsManager system contains a list of predefined modifiers. FuelsManager reserves the first 18 modifiers for standard use. You cannot edit or delete standard modifiers, but you can create custom modifiers. You can define up to eight commands for a modifier. These commands appear as selections when the operator issues a command.

Modifiers Configuration window

Modifiers can be created, edited, imported, exported, deleted inserted or replaced using the action buttons in the Modifiers Configuration window.

Creating a modifier

1. From the Resources menu in the Configuration window, select the Modifiers command, the Modifiers Configuration window appears.
2. Type in the name of the custom modifier and click New.
3. Select a coded variable from the coded variables selection list and click Add. Repeat until all coded variables for the custom modifier has been added to the Contents List.
4. Click OK to save the changes.

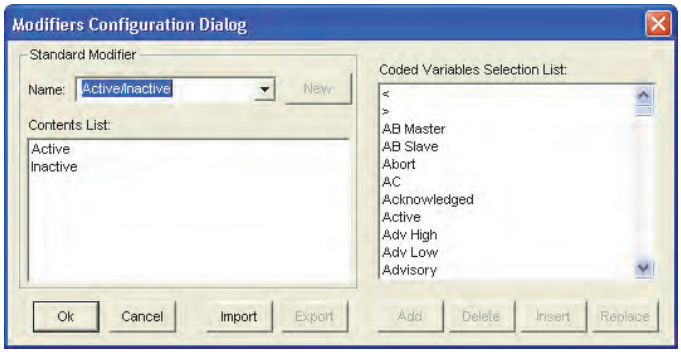


Figure 3-9: Modifiers Configuration window

Managing Help files

Entering a help file name as a system resource makes the existing help file available for different purposes. There are two types of Help files that are supported: Text Help and Windows Help Format. Help file entries can be assigned to:

- Input and Output points, in the database, in the Operate program.
- Buttons in the Draw application.

Input and output points in the database

You may want a particular help file to appear in the Operate program when the associated database point alarm becomes active. The operator selects the HELP button in the Alarm toolbar or Alarm Summary to display the help file. This help file could be used to instruct the operator to perform a sequence of steps in response to the alarm.

Buttons in the Draw application

You may want a particular help file to appear when the operator selects a button in a graphic. When creating a graphic in the Draw application, you can create buttons or Appends that displays a help file when selected in Operate. You have the option of creating a graphic button as well as a help file button.

Text help file

This type of help utilizes a user defined text file with the HTX extension. These files may be created with any text editor such as Window Notepad. These files should not be created with a word processor, since embedded formatting is not supported. The text file should consist of no more than 80 characters on each line. The length of the file should not exceed 64,000 characters, including spaces.

When the Help Append is selected in Operate, a Help Window will be displayed with the designated *.HTX file. If the complete file is too large for the window, scroll bars are provided.

Adding a help file

This section describes how to make a help file available for assignment in FuelsManager.

Help files must be located in the FuelsManager Graphics directory (default: FMProject\Graphics).

1. From the Resources menu in the Configuration window, select the Help File Names command. The Help Files Configuration window appears.
2. Under Edit, enter the help file name in the Name box.
3. If appropriate, select the Windows help format checkbox and enter a context ID.
4. Click the Add button. The help file name is added to the list.

   Note For more information about the fields and buttons in the Help Files Configuration window, see page 37.
5. Click OK. The file is now available for assignment.

Removing a help file

This section describes how you to remove a help file from the list of available files, so it is no longer available for assignment.

1. From the Resources menu in the Configuration window, select the Help File Names command. The Help Files Configuration window appears.
2. In the help file list, select the file that you want to remove.

3. Click the Delete button.
4. Click OK. The file is no longer available for assignment.

   Note For more information about the fields and buttons in the Help Files Configuration window, see section on page 37

Managing the available help files list

This section describes how you to use the Help Configuration window to manage the list of available help files.

1. From the Resources menu in the Configuration window, select the Help File Names command. The Help Files Configuration window appears.

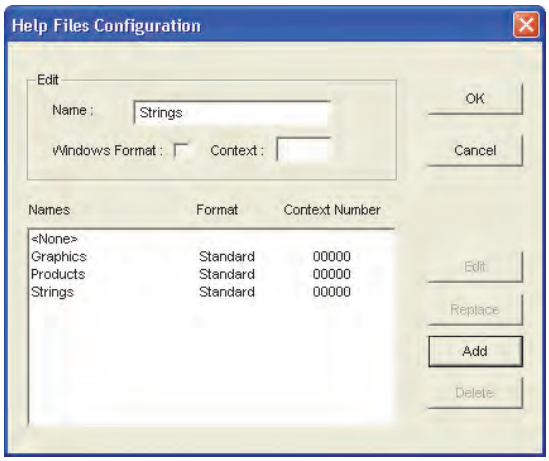


Figure 3-10: Help Files Configuration window

   Use the fields and buttons to add, edit, or remove entries as needed. Refer to the table below for detailed information about each field and button.

2. Click OK.

Button or Field	Description
Name	Field for entering the name of a help file to add a new help file to the list, or to modify an existing entry. When you select a help file in the list, the name appears in the Name field.
Windows format	Select this checkbox to indicate that the file is a Windows Help file.
Context	For Windows Help files only; to open a help file to a particular topic, enter the topic number in this field. If the Context is set to 0, the Help file will open to the initial or Contents topic.
Edit	Click this button to copy the selected help file information to the Edit fields
Replace	Click this button to transfer the Edit field information to the help files list. If a help file is selected before you click this button, it is replaced with the file defined in the Edit fields.
Add	Click this button to add a new entry in the help files list using the file described in the Edit fields

Button or Field	Description
Delete	Click this button to remove the selected help file from the help file list.

Start definitions

Start Definitions provides access to other programs through the Operate program. This allows the Operate program to always be running while users need to use other programs. For example, you can run Windows Calculator, Excel for spreadsheet editing, or Notepad for shift logs.

Start Definitions window

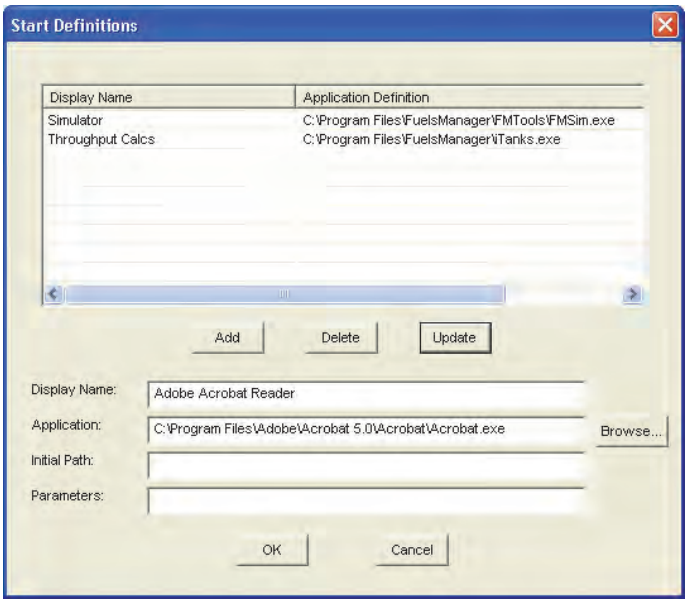


Figure 3-11: Start Definitions window

Field	Description
DISPLAY NAME	Name of the defined application to be seen in the Operate program.
APPLICATION	Name of the application to run when the display name is selected in the Operate program.
INITIAL PATH	Beginning path of the application.
PARAMETERS	Parameters to be passed into the application.

Creating a start definition

1. From the Resources menu in the Configuration window, select the Start Definitions command. The Start Definitions window appears.
2. Enter the display name, application, initial path, and parameters. Clicking browse next to Application allows you to locate the application.
3. Click Add. The new program is then added to the display name list.

Configuring Translation Tables

Translation tables define how data received/transmitted by FuelsManager is scaled or converted to the data required by the device with which FuelsManager is communicating. FuelsManager provides two types of translation tables:

- Lookup Tables – a simple table defining mapping of one set of values to another set of values.
- Scaling Functions – used to apply a mathematical formula to the value in order to scale a particular range of values to a different range of values.

FuelsManager allows the configuration of user defined names for translation tables. Once a Translation table is defined it can be used as many times as need by multiple databases points. This functionality allows the engineer to define all the required translations once and then simply assign them to the points as needed.

Translation tables can be associated with Input, Output and Triggered points. In addition, they can be applied to individual Tank Point process values via the Select Data Source accessed from the Process Data tab.

Lookup Tables

A lookup table defines a one to one mapping of one set of values to an alternate set of values. The following examples show a numeric to numeric mapping and a coded variable to numeric mapping.

From	To
10	1
20	2
30	3
..	..

Table 3-1: Numeric to Numeric Lookup Table

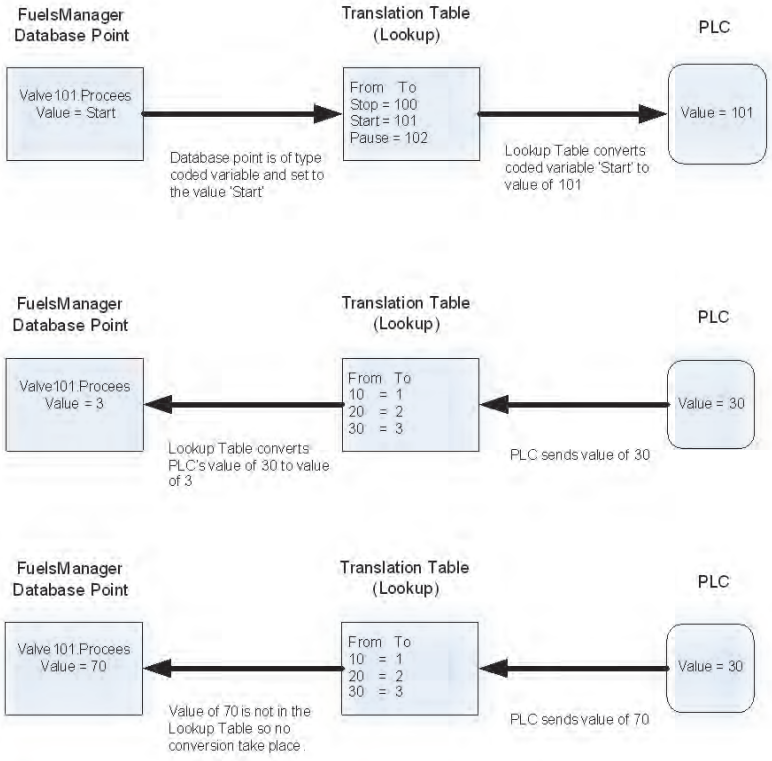
From	To
Stop	100
Start	101
Pause	102
..	..

Table 3-2: Coded Variable to Numeric Lookup Table

Lookup tables can be applied to data being received by FuelsManager and data being transmitted by FuelsManager.

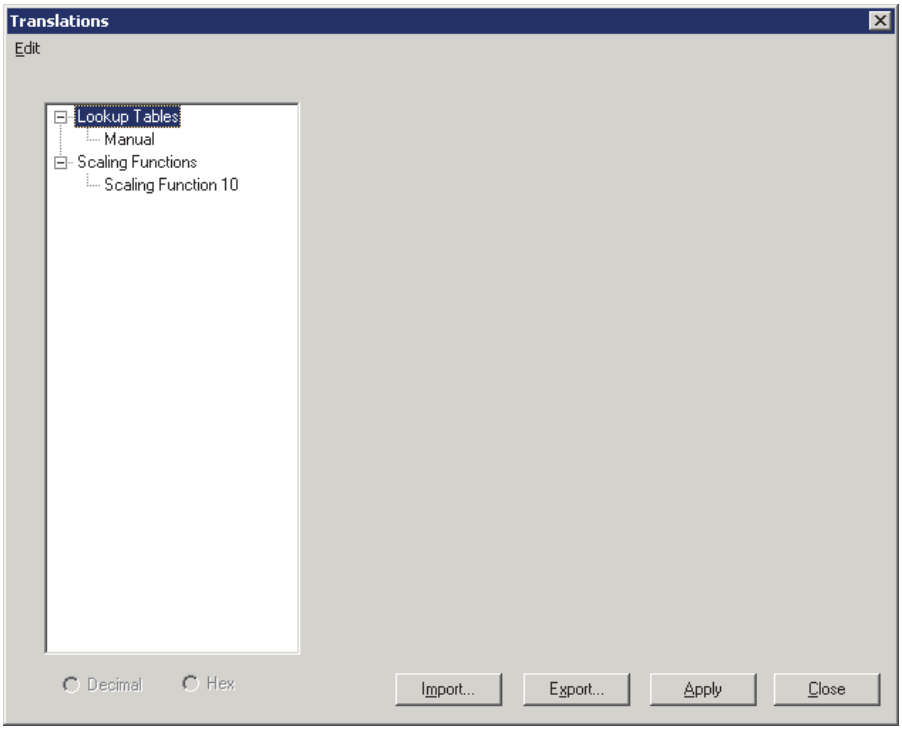
- For data received the From column defines the data being received and the To column defines the value that will be written in to the FuelsManager database.
- For data transmitted the From column defines the value in the FuelsManager database and the To column defines the value that will written to the communications interface.

In either case, transmit or receive, if a value is not defined in the lookup table no conversion is applied.

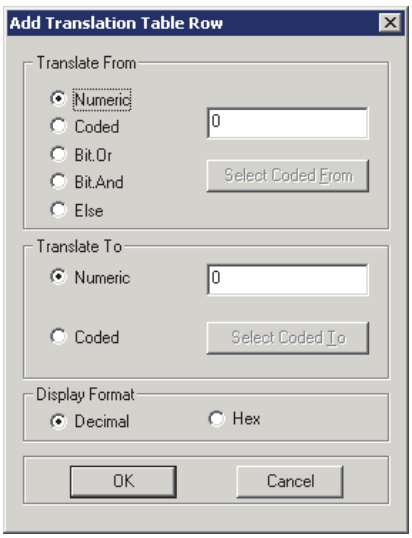


To configure a translation:

1. Open FuelsManager Configuration and click Resources > Translations. The Translations window opens and is shown below.



2. Click Edit > Add Lookup Tables and a lookup table appears in the Lookup Tables listing.
3. Right-click the newly created Lookup Table and rename it to a more meaningful name.
4. Click Edit > Add Row. The Add Translation Table Row windows opens and is shown below.



5. In the Translate From area, select one of the following:

Translate From....	Description
Numeric	Numeric value
Coded	Coded variable, the Select Coded From button becomes available for you to select a Coded Variable from the list.
Bit.Or	A logic test that returns a true if any bit matches the test.
Bit.And	A logic test that returns a true if all bits match the test.
Else	A logic test that returns a value if all other rows are false.

6. In the Translate To area, select from one of the following:

Translate To....	Description
Numeric	Numeric value
Coded	Coded variable, the Select Coded From button becomes available for you to select a Coded Variable from the list.

7. Select a Display Format of either Decimal or Hex.
8. Click OK to save the row.
9. Continue adding rows as required.
10. When the translation is complete, click Apply.

You can also import/export translations to/from a CSV file. This allows you the option of editing a long translation table in a CSV editor, such as Excel.

To import a translation table:

1. Open FuelsManager Configuration and click Resources > Translations. The Translation window opens.
2. Select the Lookup table you want to import and click Import. The Import Translations File window opens.
3. Select the file you want to import and click Open. All the translations included in the CSV file are created automatically.
4. Click Apply, then click Close.

To export a translation table:

1. Open FuelsManager Configuration and click Resources > Translations. The Translation window opens.
2. Click Export and the The Import Translations File window opens.
3. Type the file name you want to save the table as and click Save. A CSV file containing all the translations is created.
4. Click Close.
5. You can now edit the CSV file in a CSV editor.

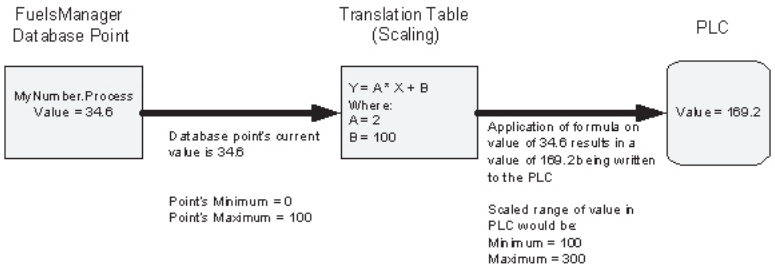
Scaling Functions

A scaling function defines mathematical formula that is applied to the value before it is received or transmitted by FuelsManager. The following formulas are supported.

- Y = A * X + B
- Y = (X–A) / (B–A)
- Y = [(X/A) * (B–C)] + C
- Y = [(X/A) / (B–A)] * (D–C) +C

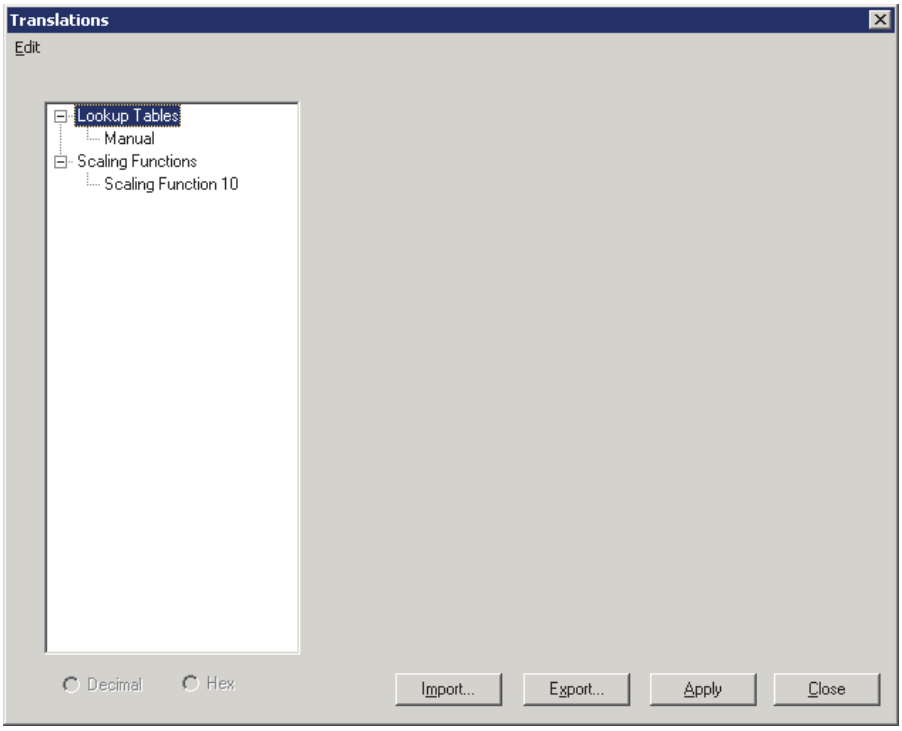
In these formulas the variable Y represents the result of the scaling and X is the value before scaling. The constants A, B, C and D are configured by you.

The following example shows data transmitted by FuelsManager, the same functionality applied to data received by FuelsManager.



To configure a scaling function:

1. Open FuelsManager Configuration and click Resources > Translations. The Translations window opens and is shown below.



2. Click Edit > Add Scaling Function and the Scaling Function is created.
3. Right-click the name and change it to a more meaningful name.
4. Click the newly renamed scaling function and the Select Polynomial area becomes active.
5. Select the appropriate polynomial and designate the constants.
6. Click Apply to save the Scaling Function.

Changing the Default Tank Detail Display

FuelsManager Operate displays tank details in a Tank Detail window. You can choose to view the default Tank Detail display or create one or more custom tank detail displays. This section describes how select the default Tank Detail display by modifying the registry.

You can also select which Tank Detail display is used for each tank. This selection is made in Tank Point configuration, as described in “Creating and Editing Tank Points” on page 82. If a Tank Detail display is not specified when the Tank Point is configured, FuelsManager uses the default display name set in the registry.

To create a new tank detail display, see “Customizing Tank Detail screens” on page 176. This section also provides some common reasons for using custom Tank Detail screens.

> Caution Using the Registry Editor incorrectly can cause serious problems that may require you to reinstall your operating system. Varec, Inc. cannot guarantee that problems resulting from the incorrect use of the Registry Editor can be resolved. Use the Registry Editor at your own risk.

1. On the Windows Start menu, click Run.
2. Type regedit in the Open field.
3. Click OK. The Registry Editor window opens.

4. In the treeview, select HKEY_LOCAL_MACHINE.
5. Double-click the following keys in sequence:
   SOFTWARE > FuelsManager > Detail

   The Path value is the location of the directory used to store the Tank Detail display file or files.

   The Tank value contains the file name for the current default Tank Detail.
6. Double-click on the Tank value. The String Editor window opens.
7. Enter the file name for the new default Tank Detail. Do not include the *.GRF file extension.
8. Click OK.
9. Close the Registry Editor.

Changing the Operate Tabbed Window Display Setting

By default, users can view multiple tabbed windows in the Operate application. You can use a Windows Registry setting to restrict Operate to display only one tabbed window at a time. This setting must be made on the client machine and is specific to each logged-on user.

Caution Using the Registry Editor incorrectly can cause serious problems that may require you to reinstall your operating system. Varec, Inc. cannot guarantee that problems resulting from the incorrect use of the Registry Editor can be resolved. Use the Registry Editor at your own risk.

1. On the Windows Start menu, click Run.
2. Type regedit in the Open field.
3. Click OK. The Registry Editor window opens.
4. In the left treeview, select HKEY_CURRENT_USER.
5. Double-click the following keys in sequence:
   Software > Varec > SCADA > Operate
6. Double-click on this value: SingleTabbedWindowOperation.
   The Edit DWORD Value window opens.
7. In the Value Data field, do one of the following:
   - Enter a 1 to restrict the display to a single tabbed window. Opening a tabbed window when one is already being displayed closes the current window.
   - Enter a 0 (default) to disable this feature. The user can now view multiple tabbed windows in Operate.
8. Click OK.
9. Close the Registry Editor.

Note Operate must be restarted for registry settings to take effect.

4 Configuring Alarms and Events

When a critical change occurs at your facility, such as a high product level or a communications failure, operators must be notified immediately so they can take necessary actions. FuelsManager Oil & Gas continuously checks the database and produces audible and visual alarms in Operate when changes occur that you have identified as being critical.

This chapter provides the information that you need to configure alarms for input and output points. Tank point alarms are predefined (“Predefined Tank Point Alarms” on page 47), but for other devices you must set up and apply alarms.

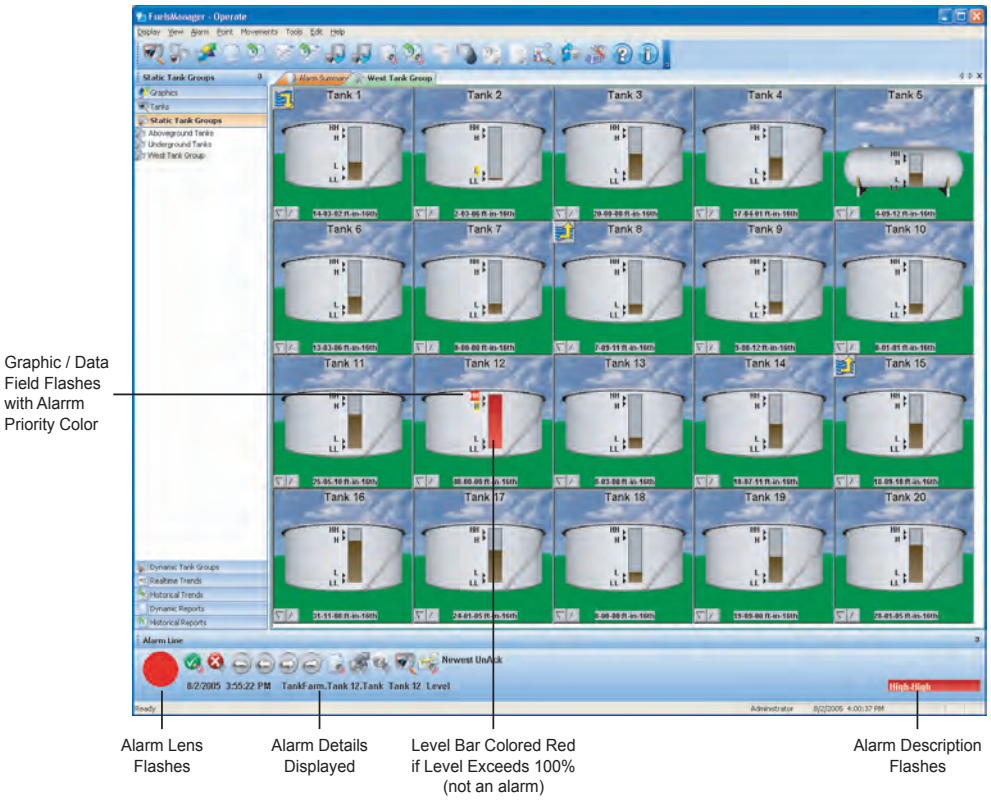


Figure 4-1: Alarm Indications in Operate

You can also define events, which describe changes that do not require immediate action. All alarms and events are recorded in a log that operators can view; see section for more information. Events are described on page 62.

Types of Alarms

Global Alarms and Local Aarms

A global alarm is an alarm that can be assigned to multiple database points that share the same data format. See page 50 for more information.

A local alarm is an alarm set up specifically for a single database point. Local alarms are the procedures for creating and using them are provided on page 54.

Alarm Templates

An alarm template is an alarm definition that can be used to create local alarms. Templates are designed to be used when multiple database points require the same alarm test conditions, but the actual test values differ for each point. See page 50 for details.

Predefined or User-Defined Alarms

Predefined alarms are those that are included with your FuelsManager installation. The predefined alarm templates and global alarms are described below. Alarms for tank points are also predefined; see page 47 for more information.

User-defined alarms must be created by a FuelsManager administrator. You can define global alarms, local alarms, and alarm templates used for building local alarms. Alarms for input and output points are not predefined.

If your system requires alarms for tank parameters that do not have predefined alarms, you can create them. For example, the water level parameter does not contain an alarm. To compensate, you first define an Input point for water level, and then define the alarm.

Predefined Alarms and Alarm Templates

Predefined Global Alarms and Alarm Templates

Your system contains several predefined Alarm Templates and Global Alarms, which are listed below. These alarms cannot be removed from FuelsManager.

Alarm	Description
Analog Alarm	Alarm Template. Contents include the High-High, High, Low, Low-Low, Advisory High and Advisory Low alarm limits.
Leak Alarm	Alarm Template. Contents include High & Low alarm limits for use with the optional Leak Detection feature.
RTU Comm.[1]	Global Alarm. Contents include port one communications error, port two communications error, communications are off line or there is complete failure in communications.
RTU Status[1]	Global Alarm. Contents include verifying the database is not empty and the RTU is programmed.
Tank Digital[2]	Global Alarm. Contents include scan failure, gauge failure, and overfill error alarms.
Tank Gauge[2]	Global Alarm. Contents include database configuration error, tank calculation error, and strapping error alarms.

Alarm	Description
Tank Mode Alarm**	Global Alarm. Contents include a movement, reverse flow, and no flow alarms.
[1] The RTU Comm. and RTU Status global alarms are tied to the RTU connected to your system.	
[2] The Tank Gauge, Tank Digital, and Tank Mode Global Alarms are tied to Tank points. Tank points have predefined alarms--meaning you do not have to build the alarm process. You only need to enable the alarm and enter a value. If the predefined tank gauge alarm doesn't match the need of your system, a new global alarm can be defined and associated with the relevant tank point.	

Predefined Tank Point Alarms

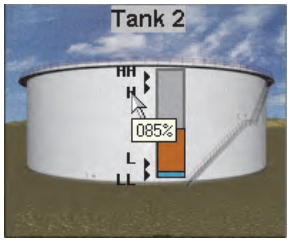
Tank points contain predefined alarms that are integrated into the tank point edit window. To configure this type of alarm, you enable the alarm and enter a value. Predefined alarms are available for certain parameters:

Tank Level	ETA
Temperature	*Leak Rate
Density	*Leak Data
Tank Flow	Vapor Pressure
Level Rate	Unauthorized Movement
Test Mode	Reverse Flow
No Flow	

*Applicable to systems using the optional Leak Detection feature

See “Alarm Information” on page 86 to modify tank point alarms.

The Operate application provides a graphical representation to the user for tank point alarms. The accompanying figure the product level indicator for a tank appearing in red to signify that a level alarm has occurred.



Changing Alarm Settings

Changing the Alarm Line Format

The Alarm Line format can be set to either the default Alarm Line or the alternate Alarm Line. The operation of each alarm line is detailed in the *FuelsManager Oil & Gas User Manual*. Usually, this setting is designated during the installation process, however if the need arises to change the Alarm Line format, follow the steps below to change the alarm line format for every user.

Note A new user's registry entries are created when the log into Operate the first time. If the UseAlternateAlarmLine registry entry is set in the HKEY_LOCAL_MACHINE, the alternate alarm line is presented. If the individual user wants to use the standard alarm line, the HKEY_CURRENT_USER registry entry must be modified.

Caution Using the Registry Editor incorrectly can cause serious problems that may require you to reinstall your operating system. Varec, Inc. cannot guarantee that problems resulting from the incorrect use of the Registry Editor can be resolved. Use the Registry Editor at your own risk.

To change the Alarm Line format for new users:

1. On the Windows Start menu, click Run.
2. Type regedit in the Open field.
3. Click OK. The Registry Editor window opens.
4. In the left treeview, select HKEY_LOCAL_MACHINE.
5. Double-click the following keys in sequence depending on the operating system you are using:

   For 32-bit operating systems:
   Software > Varec > SCADA > Operate

   For 64-bit operating systems:
   Software > Wow6432Node > Varec> SCADA > Operate
6. Double-click the value for: UseAlternateAlarm Line
7. In the Value Data field, do one of the following:
   - Enter a 1 to enable the alternate alarm Line.
   - Enter a 0 (default) to enable the default alarm Line.
8. Click OK.
9. Close the Registry Editor.

To change the Alarm Line format for a single user:

1. Shutdown Operate.
2. On the Windows Start menu, click Run.
3. Type regedit in the Open field.
4. Click OK. The Registry Editor window opens.
5. In the left treeview, select HKEY_CURRENT_USER.
6. Double-click the following keys in sequence:
   Software > Varec > SCADA > Operate
7. Double-click the value for: UseAlternateAlarm Line
8. In the Value Data field, do one of the following:
   - Enter a 1 to enable the alternate alarm Line.
   - Enter a 0 to enable the default alarm Line.
9. Click OK.
10. Close the Registry Editor.

Changing the Alarm Display Mode

By default, FuelsManager Operate shows the newest unacknowledged alarm on the Alarm Line. Each time an alarm occurs, it replaces the previous alarm on the Alarm Line.

You can also set Operate to show the oldest unacknowledged alarm on the Alarm Line by changing a Windows registry setting.

This setting is made on the client machine and applies to any user logging on to that machine.

> Caution Using the Registry Editor incorrectly can cause serious problems that may require you to reinstall your operating system. Varec, Inc. cannot guarantee that problems resulting from the incorrect use of the Registry Editor can be resolved. Use the Registry Editor at your own risk.

1. On the Windows Start menu, click Run.
2. Type regedit in the Open field.
3. Click OK. The Registry Editor window opens.
4. In the left treeview, select HKEY_LOCAL_MACHINE.
5. Double-click the following keys in sequence:
   Software > Varec > SCADA > Operate
6. Double-click on this value: UseOldestUnAckOnAlarmLine.
   The Edit DWORD Value window opens.
7. In the Value Data field, do one of the following:
   - Enter a 1 to show the oldest unacknowledged alarm on the Alarm Line.
   - Enter a 0 (default) to disable this feature and display the newest unacknowledged alarm on the Alarm Line.
8. Click OK.
9. Close the Registry Editor.

> Note Operate must be restarted for registry settings to take effect.

Showing the Date, Time and User Name

By default, Operate shows the current date, time, and user name in the status area at the bottom of the Operate main window. You can set Operate to show this information on the Alarm Line also by changing a a Windows Registry setting.

This setting is made on the client machine and applies to any user logging on to that machine.

> Caution Using the Registry Editor incorrectly can cause serious problems that may require you to reinstall your operating system. Varec, Inc. cannot guarantee that problems resulting from the incorrect use of the Registry Editor can be resolved. Use the Registry Editor at your own risk.

1. On the Windows Start menu, click Run.
2. Type regedit in the Open field.
3. Click OK. The Registry Editor window opens.
4. In the left treeview, select HKEY_LOCAL_MACHINE.
5. Double-click the following keys in sequence:
   Software > Varec > SCADA > Operate
6. Double-click on this value: TimeUserOnAlarmLine.
   The Edit DWORD Value window opens.
7. In the Value Data field, do one of the following:
   - Enter a 1 to show the date, time, and user name on the Alarm Bar.
   - Enter a 0 (default) to disable this feature. The date, time, and user name are not shown on the Alarm Line.

8. Click OK.
9. Close the Registry Editor.

   Note Operate must be restarted for registry settings to take effect.

Working with Global Alarms and Alarm Templates

This section provides the information that you need to create, edit, and use global alarms and alarm templates. To learn more refer to the following list to find a specific procedure.

Open the list of global alarms and templates	page 50
Create a global alarm or alarm template	page 51
Edit a global alarm or alarm template	page 52
Assign a global alarm to a database point	page 53
Importing or exporting global alarms and templates (Describes how you can import global alarms and alarm templates from a .csv file, and export them to a .csv file)	page 53

To learn how to use an alarm template in a local alarm, see “Creating and Assigning a Local Alarm” on page 54.

To remove a global alarm from a database point, see section on page 57.

Understanding Global Alarms and Alarm Templates

Global alarms are alarms that you can assign to more than one database point. Each global alarm consists of one or more alarm limit conditions and each has a data format. You can only assign a global alarm to database points with the same data format. When you edit a global alarm, the changes affect all assigned database points. You can also use Global Alarms as a reference for building other alarms.

Alarm templates are reusable alarm definitions consisting of one or more alarm limit conditions. Templates are used to create local alarms. Templates are designed to be used when multiple database points require the same alarm test conditions, but the actual test values differ for each point. Limits for numerical data are specified in percentages. When a template is applied, the percentage values are converted numerical values based on the maximum value of the database point variable. Editing an alarm template does not affect points that have used the template.

For a definition of global alarms and alarm templates, refer to “Types of Alarms” on page 46.

Opening the Global Alarms and Alarm Templates List

FuelsManager Oil & Gas maintains an index or list of global alarms and alarm templates that you can access directly using the procedure below. You can also access the list of global alarms and templates through a database point.

This section describes how you can access the list of global alarms and alarm templates so you can create, edit, import, export, or delete them.

- In the FuelsManager Configuration window, on the Database menu, click Alarms. The Global Alarm Definitions window appears. Use this method to obtain access to all defined global alarms and templates, for all data formats.

- You can also access global alarms through the Alarm Assignments window for a specific database point. When you use this method, the data format of the global alarms and templates that you can create or modify is constrained to the data format of the point that you are editing. See “Assigning a Global Alarm to a Database Point” on page 52 for more information.

Creating a Global Alarm or Alarm Template

1. Open the Global Alarm Definitions window.

   In the Used column, “template” indicates an Alarm Template. A number appearing in the Used column identifies the number of database points using the Global Alarm.

2. Click New, the Define Global Alarm window appears

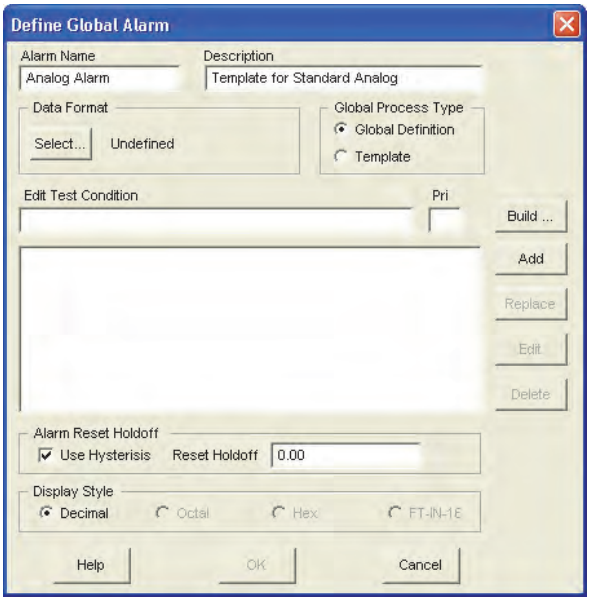


Figure 4-2: Define Global Alarms window

3. Type the alarm name and description. The name and description appear in the Global Alarm Definitions window
4. Under Global Process Type,
   - Select the Global Definition option to create a global alarm.
   - Select the Template option to create an alarm template.
5. Under Data Format, click Select and select a format. This determines which database points this global alarm or template can be assigned to (points with the same format).
6. Under Edit Test Condition, set up the alarm limit condition(s). Refer to “Working with Alarm Limits” on page 59 for detailed instructions.

   Note When building an alarm limit for an Alarm Template, the Test Value must be entered as a percentage from 0.00 to 1.00.

7. Enter the attributes such as Use Hysteresis and Reset Holdoff value
8. To change how the conditions are displayed in this window, change the setting under Display Style.

9. Click the OK button. The new Global Alarm or Alarm Template is ready to be assigned as you configure your system database. See “Assigning a Global Alarm to a Database Point” on page 52 for instructions.

Editing a Global Alarm or Alarm Template

Note If the Global Alarms window is opened during database edit, only the Global Alarms or templates matching the selected point’s data format are displayed.

1. Open the Global Alarm Definitions window.

   In the Used column, “template” indicates an Alarm Template. A number appearing in the Used column identifies the number of database points using the Global Alarm.

2. Select a global alarm or alarm template, and then click the Edit button. The Define Global Alarm window appears.

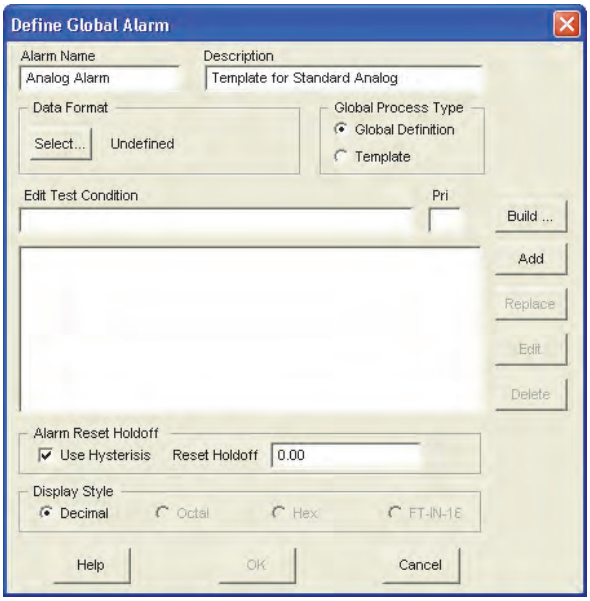


Figure 4-3: Define Global Alarms window

3. Modify the settings as appropriate. To edit the alarm conditions, refer to “Working with Alarm Limits” on page 59.

   Note! When building an alarm limit for an Alarm Template, the Test Value must be entered as a percentage from 0.00 to 1.00.

4. Click the OK button to save your changes.

Assigning a Global Alarm to a Database Point

After you assign a global alarm to a database point, FuelsManager Oil & Gas checks the database point regularly and presents an alarm if the alarm conditions are met.

To remove an alarm assignment, see page 57.

1. From the FuelsManager Configuration application Database menu, select the Points command. The Database Edit window appears.
2. Select the input or output point for which the alarm is to be defined, and then select Edit. The Edit Point window appears.

3. Select the Details tab in the Edit Point window.
4. Click the Alarm Defined option button in the Edit Point window.
5. Click the Edit Alarm button. The Alarm Assignments window appears.
6. Under Alarm Limits, select the Global Alarm option and then click the Select Global button. The Global Alarm Definitions window appears.
7. Select a global alarm in the list, and then click the Done button. In the Alarm Assignments window, the alarm limits (conditions) defined in the global alarm appear in the Alarm Limit Enable list.

   You can also create new global alarms, edit alarms, or perform other tasks if needed at this stage.
8. Under Alarm Limit Enable, disable or enable individual alarm tests as appropriate. To do this, select a code and then click the Enable or Disable button.
9. To assign a graphic to the alarm, use the Alarm Graphic options as described on page 56.
10. To assign a help file (text or Windows Help) to the alarm, use the Alarm Help options as described on page 57.
11. Under Alarm/Event Category, select an alarm category if appropriate.

    You can assign alarms to alarm categories (see the Security section) to ensure that operators are only presented with the alarms that apply to them. For more information about alarm categories, including instructions for adding categories, see “Categories” on page 12.
12. Click the OK button.

Importing and Exporting Global Alarms and Templates

Global alarms and alarm templates can be imported or exported as a comma-delimited text file with the.csv extension. This is useful if alarms are defined for another database, or as a backup method.

Importing Global Alarms and Templates

1. From the FuelsManager Configuration application Database menu select the Alarms command, the Global Alarm Definitions window appears.
2. Click Import, the Import Alarm Definition File window appears.
3. Select the comma-delimited text file you want to import and click OK.

The system imports the alarms and displays them in the Global Alarms Definitions window.

Exporting a Global Alarms and Templates

1. From the FuelsManager Configuration application Database menu select the Alarms command, the Global Alarm Definitions window appears.
2. Click Export to export all alarms or select the global alarm to export.
3. The Export Alarm Definition File window appears.
4. Enter an export file name and click OK.

The system saves the global alarm(s) in a comma-delimited text file with the .csv extension.

Working with Local Alarms

A local alarm is an set of alarm conditions that are specified for a single database point variable. You can build a local alarm from the foundation, or you can use generic alarm templates (see page 50) as a starting point.

Refer to the following procedures to manage local alarms:

- "Accessing the alarm configuration for a point" on page 54
- "Creating and Assigning a Local Alarm" on page 54
- "Editing a Local Alarm" on page 55

To remove an alarm assignment, see page 57.

Accessing the alarm configuration for a point

This procedure prepares you for building or editing a local alarm for a database point, or assigning a global alarm to a database point.

1. From the FuelsManager Configuration application Database menu, select the Points command. The Database Edit window appears.
2. Select the input or output point for which the alarm is to be defined, and then select Edit. The Edit Point window appears.
3. Select the Details tab in the Edit Point window.
4. Click the Alarm Defined option button in the Edit Point window.
5. Click the Edit Alarm button. The Alarm Assignments window appears.

Creating and Assigning a Local Alarm

Local alarms are unique to the point to which they are assigned. Establishing a local alarm involves defining the alarm conditions and setting other parameters as alarm graphics and alarm categories.

To remove an alarm assignment, see page 57.

1. Open the Alarm Assignments window for a database point.

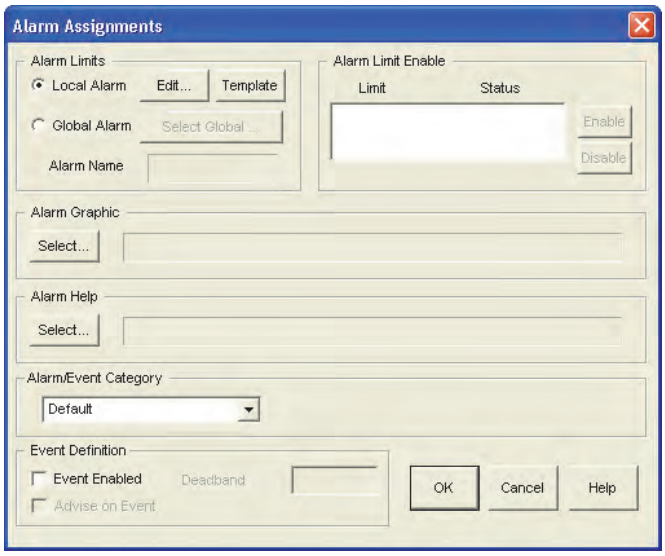


Figure 4-4: Alarms Assignments window

2. Under Alarm Limits, select the Local Alarm option if it is not selected.
3. Under Alarm Limits, do one of the following:
   - To build the limit conditions without using a template, click the Edit button.
   - To use the limit conditions defined in an alarm template, click the Template button. In the Global Alarm Definitions window, select a template, and then click the Done button.
4. Assemble the alarm limit conditions for this alarm as described in "Working with Alarm Limits" on page 59.
5. Under Alarm Limit Enable, disable or enable individual alarm limit as appropriate. To do this, select a limit and then click the Enable or Disable button. No status is shown for enabled limits.
6. To assign a graphic to the alarm, use the Alarm Graphic options as described on page 56.
7. To assign a help file (text or Windows Help) to the alarm, use the Alarm Help options as described on page 57.
8. Under Alarm/Event Category, select an alarm category if appropriate.

   You can assign alarms to alarm categories (see the Security section) to ensure that operators are only presented with the alarms that apply to them. For more information about alarm categories, including instructions for adding categories, see page 12.
9. Click the OK button.

Editing a Local Alarm

You can modify a local alarm to change the alarm conditions and reset other parameters such as alarm graphics and alarm categories.

1. Open the Alarm Assignments window for the database point to which the alarm is assigned.

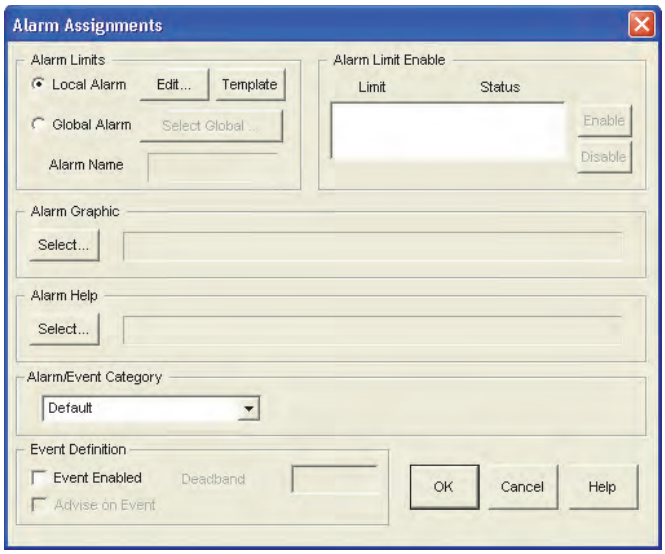


Figure 4-5: Alarms Assignments window

2. Modify the settings as appropriate.
   - For detailed information about each setting, see “Creating and Assigning a Local Alarm” on page 54.
   - To edit the alarm conditions, refer to “Working with Alarm Limits” on page 59.
3. Click the OK button to save your changes.

Assigning a Graphic or a Help File to an Alarm

When you assign a local or global alarm to a database point, You can set up your alarms to make help graphics and help files available when an alarm occurs. You can select from a number of standard graphics to display, or use a help files (.htx) to give the operator more information or instructions regarding the alarm.

Before You Begin

All alarm help files must be properly assigned and entered into FuelsManager with the Help Files Configuration feature (see Defining System Resources).

Graphic files must have been generated and must be included in the Graphic File Index before they can be associated with alarms. Refer to section , "Using file indexes" on page 156 for more information.

Assigning an Alarm Graphic to an Alarm

Any graphic included in the Graphics Index can be assigned to an alarm for a specific database point. During the assignment process, you can decide if the graphic will automatically appear when the alarm occurs, or if the operator must take an action to show the alarm.

For more information about the Graphic Index, see section , "Using file indexes" on page 156.

Before you begin, open the Alarm Assignments window as described in section on page 54.

1. In the Alarm Assignments window, under Alarm Graphic, click the Select button. A window appears showing available graphics.
2. Under Available Displays, select a graphic.

If the OK button is not available after you select a graphic, you have selected a template graphic. Under Available Templates, select the database point to associate with the template graphic when it is opened.

3. To make the graphic appear automatically each time that the alarm occurs, select the Auto Run option.
4. Click OK. The Alarm Assignments window appears with the graphic file that you selected displayed in the Alarm Graphics area.

Assigning a Help File to an Alarm

You can assign a text help file (.htx) to an alarm to present alarm-related information to the operator.

Help files must be located in the FuelsManager Graphics directory (default: FMProject\Graphics).

1. In the Alarm Assignments window, under Alarm Help, click the Select button. The Help Files Configuration window appears.
2. In the list of available help files, select a file.

   For more information about Help files, including instructions for adding files to the list, see "Managing Help files" on page 36.
3. Click OK. The help file that you selected appears in the Alarm Help area of the Alarm Assignments window.

Removing an Alarm from a Database Point

In some situations, you may need to remove a global or local alarm assignment from a database point. Doing this clears all alarm settings from the database point, including alarm limits, graphics or help files.

When you remove a global alarm assignment, the global alarm still exists for use with other database points. When you remove a local alarm assignment, you delete the alarm limits permanently.

1. From the FuelsManager Configuration application Database menu, select the Points command. The Database Edit window appears.
2. Select the input or output point for which the alarm is defined, and then select Edit. The Edit Point window appears.
3. Select the Details tab. If an alarm is assigned to the point, the Alarm Defined checkbox under Alarm/Event Configuration will be selected.
4. Deselect the Alarm Defined checkbox. A message appears asking you if you want to delete the alarm definition.

   Caution Clicking Yes removes the alarm immediately in the database.
5. Click Yes. The alarm assignment is removed.

Importing and Exporting Points

Files consisting of Input, Output, Triggered, and Tank point information can be imported and exported. FuelsManager also enables you to import manual values, calculated values, forced values, strap tables, and source assignments. This feature has been provided so that you can create an Input, Output Triggered, or Tank point using external applications such as Excel or Notepad. Not only can this method save time involved in initial configuration, but it can also be used as a backup utility or a method for making bulk changes to the configuration.

Creating a *.csv file involves entering the column headers and entering the associated point parameters. These files can only exist as comma delimited files (*.csv).

The parameters found in the file vary based on the type of data exported. The file types are described in the following table:

Import / Export Data Type window	
INPUT POINTS	Files contain all the attributes associated with an Input point
OUTPUT POINTS	Files contain all the attributes associated with an Output point
TRIGGER POINTS	Files contain all the attributes associated with a Triggered point
TANK POINTS	Files contain all the attributes associated with a Tank point
STRAP TABLES	Files contain tank and strap table file names
SOURCE ASSIGNMENTS	Files contain the Database tag, variable, data source type, database system, interfaces, device, and connected I/O communication point entries. For example: Tank-1.Low-Stop,VALUE,NONE Tank-1.Gauge,LEVEL,COMM,\\GRAY1,TSU 1,Tank 1,Level, Tank-1.Gauge,TEMP,COMM,\\GRAY1,TSU 1,Tank 1,Temperature, Tank-1.Gauge,DENSITY,CALC Tank-1.Gauge,LVL_H20,MANUAL
MANUAL VALUES	Files contain the Database tag, variable, and value entries. The value is an assigned command, for example - STOP Tankfarm.Tank.A301,BSW,0 Tankfarm.Tank.A301,STD_DENS,67.10898
FORCED VALUES	Files contain Database tag, variable, and value entries. The value is a forced value. For example Area42.Tank37,LEVEL,220
CALC VALUES	Files contain Database tag, variable, and value entries. The value is the calculated value. Uncalculated points contain the * Uninitialized * parameter. for Example Tank-2.Gauge,FLOW,* Uninitialized * Tank-3.Gauge,DENSITY,75.87801

The Input, Output, Triggered, and Tank point data types add points to the database. The other data types are reference values assigned to the existing points in the database. For example, the Manual Values data type file assigns manual values. The import function finds that particular database point and variable, and then assigns the manual value.

> Note Before performing the tasks to import or export points, the default value (i.e. 123,456,789) in the Digit Grouping field needs to be changed to (123456789) on the Customize Regional Options - Numbers tab. After completing the Export and Import functions, change the Digit Grouping field back to its default value (i.e. 123,456,789)

To import a point file

1. In the Database Edit window, click Import. The Import/Export Data Type window appears. This window lists the types of data that can be imported and exported.
2. Select the desired data type and click OK.

3. The appropriate Import File window appears.
4. Select the desired file and click OK.
5. A window appears briefly indicating that the selected file is being imported.

To export a point file

1. In the Database Edit window, click Export.
2. The Import/Export Data Type window appears.
3. Enter a file name and select the directory.
4. Click OK.
5. A window appears briefly indicating that the selected data type is being exported to the selected file.

Working with Alarm Limits

An alarm limit defines a condition that must be met for an alarm to occur. Global alarms, alarm templates, and local alarms are assembled using one or more alarm limits.

When you assign a global or local alarm to a database point, the limits in the alarm are associated with the point. Each time FuelsManager checks this point in the database, it tests the condition specified in each alarm limit statement. When any condition is met, an alarm is generated.

Accessing Alarm Limits

Before you can edit or build alarm limits, you must open a global alarm, template, or local alarm as described in one of the following procedures.

To accessing alarm limits through a global alarm or template

1. Open the Global Alarm Definitions list as described in Assignments window as described on page 50.
2. Click the New button, or select a global alarm or template and then click the Edit button. The Define Global Alarm window appears.

To accessing alarm limits through a local alarm

1. Open the Alarm Assignments window as described on page 54.
2. Under Alarm Limits, select Local Alarm, and then click the Edit button. The Define Alarm Process window appears.

Creating, Editing, and Removing Alarm Limits

This section describes how to build, modify, or delete one or more alarm limits for a global alarm, an alarm template, or a local alarm.

Building or changing limit conditions is part of creating or editing a global alarm or template (see page 51 or page 52). It is also part of creating or editing a local alarm (see page 54 or page 55).

Before you begin, the Define Global Alarm or Define Alarm Process window must be open. If it is not, see “Accessing Alarm Limits” on page 59.

To create an alarm limit

1. In the Define Global Alarm or Define Alarm Process window, do one of the following:
   - Type the alarm limit statement in the Edit Limit Condition or Edit Test Condition box
   - Click the Build button to assemble a statement from option lists. For instructions, see page 61. Click the OK button. The limit condition appears in the limit list.
2. Enter an alarm priority level from 0 to 4 in the Pri box.
3. Click the Add button. The limit condition and priority appears in the limit list.

   Note To change the units displayed for alarm limits in this window, select a different option under Display Style if options are open.

To finish setting up the global alarm, alarm template, or local alarm, refer to one of the sections listed at the beginning of "Creating, Editing, and Removing Alarm Limits" on page 59.

To edit or replace an alarm limit

1. In the Define Global Alarm or Define Alarm Process window, select one of the limits listed.

   Note To change the units displayed for alarm limits in this window, select a different option under Display Style if options are open.
2. Click the Edit button. The limit condition is copied to the Edit Limit Condition or Edit Test Condition box, and the priority appears in the Pri box.
3. Edit the limit statement and/or priority as appropriate. To reassemble the statement using option lists, click the Build button and follow the instructions on page 61.
   - If you are working with an alarm template, you must enter any numerical value as a percentage as a number equal to or less than 1.00. When the template is applied to an alarm, this percentage in each limit is translated to a number equal to the actual value of the point variable times the percentage.
4. Check to be sure that the limit you are editing is still selected in the list, and then click the Replace button. Your changes are applied to the limit in the list.

To finish setting up the global alarm, alarm template, or local alarm, refer to one of the sections listed at the beginning of "Creating, Editing, and Removing Alarm Limits" on page 59.

To delete an alarm limit

1. In the Define Global Alarm or Define Alarm Process window, select one of the limits listed.
2. Click the Delete button. The limit is removed.

To finish setting up the global alarm, alarm template, or local alarm, refer to one of the sections listed at the beginning of section .

Applying a Reset Holdoff to Alarm Limits

Some database point values such as level or temperature can fluctuate frequently, causing alarms to be generated too frequently. In this situation, you can apply a tolerance range, called a reset holdoff, to each limit condition in the alarm definition. An alarm will be activated only if the relative change is equal to or greater than Reset Holdoff amount.

1. In the Define Global Alarm or Define Alarm Process window, under Alarm Reset Holdoff, select the Use Hysteresis checkbox.
2. In the Reset Holdoff box, enter a tolerance. An alarm will only be generated if the change in value exceeds the reset holdoff amount.
   - If you are working with an alarm template, you must enter a percentage as a number equal to or less than 1.00. When the template is applied to an alarm, this percentage in

each limit is translated to a number equal to the actual value of the point variable times the percentage.

Building an Alarm Limit using the Build Button

You can create an alarm limit by using the Build button to select limit options from lists. FuelsManager only presents options that are appropriate for the applicable data format, and that fit other options.

Building an alarm limit is part of the procedure “To create an alarm limit” on page 60.

for Before you begin, open the Define Global Alarm or Define Alarm Process window, as described in “Accessing Alarm Limits” on page 59.

1. If the Build Alarm Limit window is not opened, click the Build button in the Define Global Alarm or Define Alarm Process window.
2. Click the Test Type button. The Alarm Test Codes window appears.
3. Select the desired code and click OK. The table below describes each code.

Test Code	Description
.EQU.	Database Value equal to Test Value
.NEQ.	Database Value not equal to Test Value
.LES.	Database Value less than Test Value
.LEQ.	Database Value less than or equal to Test Value
.GRT.	Database Value greater than Test Value
.GEQ.	Database Value greater than or equal to Test Value
.BIT.	Bit Set in Database Value which matches Bit in Test Value
.MASK.	Any Bit(s) Set in Database Value matches any Bits in Test Value
.NINT*	Not Initialized
.OFLN.*	Off Line
.DIS.*	Disabled
.IOFL.*	IO Fail
.IODI.*	IO Disabled
.IOFO.*	IO Forced
.IOWR.*	IO Warning
.OVR.*	Over Range
.UNR.*	Under Range
.INV.*	Invalid
.ORDE.*	Overridden

* For these codes, only the description is shown in the list.

4. Click the Test Value button, if it is enabled.
   - If the data format is a coded variable, the Test Value button will be enabled.
   - If the data format is numeric, the Test Value button will be disabled. Test Values must be typed in manually
   - If the data format is a user-defined string type, the Test Value button will be enabled. Clicking the button will show a list of attributes of the applicable user-defined string type.

5. Select a test value and then click the OK button.
6. Click the Result Code button if it is enabled.
7. Select a result code and then click the OK button.
   - If the data format is Time and Date, you must enter a time and date, which will be set to the system default time and date.
8. Click the OK button to close the Build Alarm Limit window. The new limit statement appears in the Define Global Alarm or Define Alarm Process window.

Working with Events

Events are changes to a database point value that do not require immediate attention but are important enough to be recorded in a log that operators can review. You can assign events to numerical or non-numerical point values.

Examples of events are:

- Operator commands – opening a valve or raising a tank gauge
- Value change by the operator – entering a new manual value for water level or changing a high level alarm setpoint
- Value change by the system – communication request from another system, via OPC or a CommManager driver, to change the density value or issue a command to reset a tank gauge

To create an event, see page 62. To edit an event, see For more information about the alarm & event log, refer to page 64.

Creating an Event

Creating an event is a restricted version of building a local alarm: you build or select alarm limits (conditions) and identify the definition as an event. Alarm graphics and alarm help files are not used with events.

1. Open the Alarm Assignments window as described on page 54.

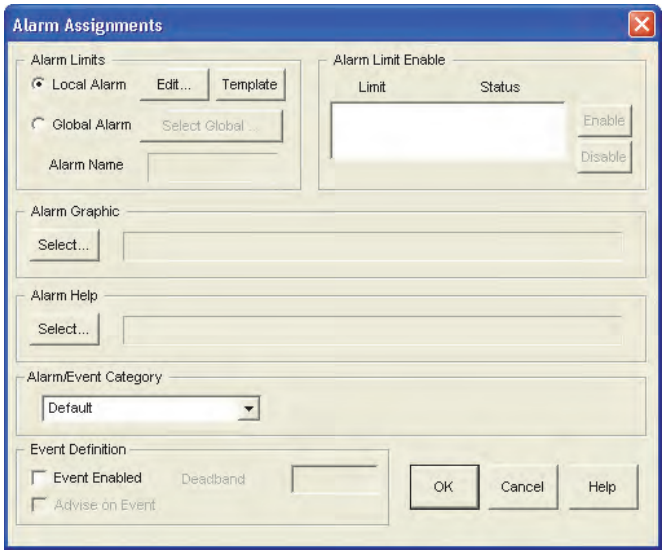


Figure 4-6: Alarms Assignments window

2. Under Alarm Limits, select the Local Alarm option if it is not already selected.
3. Under Alarm Limits, click the Edit button. The Define Alarm Process window appears:
   a. Type in a test condition by entering the Test Type, the Test Value, and the Result or use the Build feature. In the Pri edit box, type in a priority (0–Lowest through 3–Highest).
   b. Enter the attributes such as Use Hysteresis and Reset Holdoff value, The attributes have the functionality and purpose as defined in the Defined Global Alarm window.
   c. Click Add to enter the test condition into the condition list.
   d. Repeat the build and add process until all alarm test conditions have been added.
   e. Click OK when all test conditions are entered. The Alarm Assignments window appears.
4. Under Alarm Limit Enable, disable or enable individual alarm tests as appropriate. To do this, select a code and then click the Enable or Disable button.
5. Under Alarm/Event Category, select a category if appropriate. For more information, see “Categories” on page 12. The alarm/event category determines which users will
6. Under Event Definition, select the Event Enabled checkbox, and then further define the event if appropriate:
   - To apply a deadband to each limit condition, enter the deadband value in the Deadband box.
   - To show a message to the operator each time the event occurs, select the Advise on Event checkbox.
7. Click OK.

Editing an Event

You can modify a local alarm to change the alarm conditions and reset other parameters such as alarm graphics and alarm categories.

1. Open the Alarm Assignments window for the database point to which the event is assigned, as described on page 54.
2. Modify the settings as appropriate.

   For detailed information about each setting, see “Creating an Event” on page 62.
3. Click OK to save your changes.

Removing an Event from a Database Point

1. From the FuelsManager Configuration application Database menu, select the Points command. The Database Edit window appears.
2. Select the input or output point for which the event is defined, and then select Edit. The Edit Point window appears.
3. Select the Details tab. If an event is assigned to the point, the Alarm Defined checkbox under Alarm/Event Configuration will be selected.
4. Deselect the Alarm Defined checkbox. A message appears asking you if you want to delete the alarm definition.

   Caution Clicking Yes removes the event immediately in the database.
5. Click Yes. The event assignment is removed.

Alarm & Event Logs

All alarms and events are recorded to the same log file and can be viewed via the FuelsManager Log File Browser feature in Operate.

FuelsManager creates one alarm and event file per day. By default this file is written to the following folder:

\Program Files\FuelsManager\FMProject\Log.

Printing Alarm and Event Logs

Alarms and events can be printed manually, or at specified times depending on the configuration of the Alarm Category to which the alarms belong (see "Working with Alarm Categories" on page 13).

Viewing the Alarm and Event Log

1. Open Operate.
2. On the Alarm menu, click Show Log File Browser.
3. Select the appropriate options and then click the Open button.

See the user manual for more detailed instructions for viewing the alarm and event logs.

Disabling Event Logging from OPC Data Sources

You can reduce the number of events logged to the event log by disabling the logging of events from OPC data sources.

1. Create the DWORD value 'LogOPCcommands' under the following registry key: HKEY_LOCAL_MACHINE\SOFTWARE\FuelsManager\DataManager.
2. Do one of the following:
   - Set the value to one (1) to allow the logging of events from OPC data sources.
   - Set the value to zero (0) to disable the logging of events from OPC data sources.

5 Configuring Database Points

Introduction to Databases

The FuelsManager database is an arrangement of data files that work together to retain real-time and calculated data. This data is represented by elements called Points, and are arranged in a tree-like structure with up to four levels. The levels are arranged from broad (Level X) to specific (Level 0) - the default is three levels. To set the number of levels, see page 72.

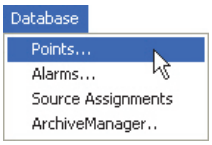
On each execution cycle, the controlling system called the DataManager performs tank calculations, database calculations, and alarm detection, data conversion and/or reporting based on a points value change.

Configuring a database involves creating points. Alarms and events can be assigned to these points. Once the point is defined, it becomes available to the FuelsManager subprograms and subsystems.

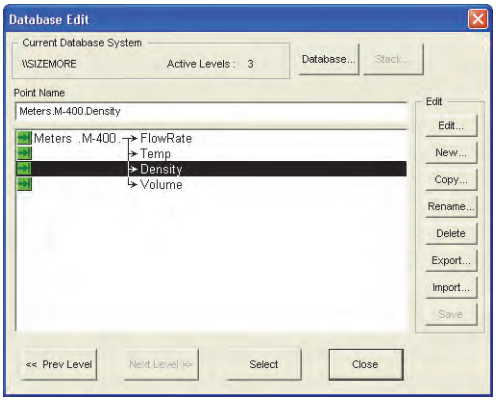
> Note The FuelsManager Configuration application contains most of the configuration processes you use to configure a FuelsManager database.

The database is mainly accessed through the FuelsManager Configuration application, but depending upon your user privileges the database can also be edited from several other areas of the application.

1. To access the database, start the FuelsManager Configuration application.
2. From the Database menu, select the Points command as shown below.



3. The Database Edit window appears as shown below.



4. To edit a local or remote database, confirm the following:
   - User has permission to access the target machine
   - Machine is currently running FuelsManager
   - DataManager on target machine is active

- Also, if database resides on a remote system, confirm Network connection exists between your machine and the remote machine

5. Follow the instructions later in this chapter for creating and editing database points

Point Types

- Tank
- Input
- Output
- Triggered

Tank Point

A Tank point includes predefined variables specifically designed for tank gauging applications. The behavior of the tank point is configured via the tank configuration windows. A tank variable is any component of the tank such as tank level, flow, and temperature. Each tank provides process values, or tank variables, which may be entered manually, received from a field device or internally calculated. These process variables are listed in the Glossary.

Input Point

Input points are used to receive data from generic field equipment, database calculations or manual input. Typically, these points are used to hold data for equipment that is not tank specific (i.e. pumps, values or motors). However, they can also be used to store tank information not covered by the FuelsManager Tank Point.

Output Point

Output points are used to transmit data from the database to field equipment. Typically, outputs are derived from an operator issuing commands, however, they can also be derived from an internal calculation process.

Output points may be configured to update the local process value immediately from the command value or to update the database point value based on inputs from the field equipment.

Triggered Point

Triggered points are used as an intermediary between points. FuelsManager uses a triggered point to monitor another point. When it sees a change in the point, the point gets sent to another point in the database.

Triggered points are typically used to monitor database input from a gauge. Once the point changes, the triggered point sends it to another point such as an output point for an OPC server or a PLC.

Point Attributes

When creating FuelsManager database points you must define certain point attributes. These attributes define how the data is stored; the source of the data; the range and type of data; any alarm or event processing, and who can access the data.

Engineering Units

Engineering units can be configured for all point types. These engineering units are used to calculate the value and used to represent the value in graphics and reports. If engineering units are changed, you are given the option of automatically recalculating the scale limits.

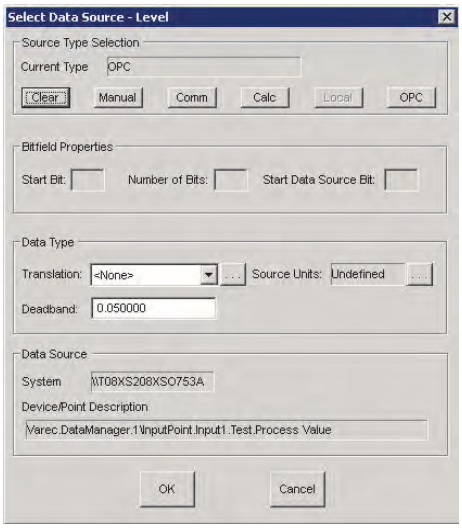
Scale Limits

Scale limits can be defined for all point types. They are only available for numeric process variables such as level, temperature, volume, density, standard density, mass, and flow.

Scale limits are defined for a couple of reasons. One, they define the ranges used for bar graphs and trend plots. Second, they define the ranges used by Operator Commands. Inside the Operate Command window is a scroll bar that is used to manually set a new value. Scale limits determine the minimum and maximum values of the scroll bar.

Data Source

Each point must be assigned a data source. As the name implies, the data source defines how data is received to update the point's current value. Input points are assigned one source: the source of incoming data. Output points are assigned two sources: one for the source of incoming data and the other for the output destination. Each process variable in a Tank point is assigned a source. The Data Source—Level window is shown below as an example.



The available source selections include the following:

Manual Input

The Manual data source is used when the operator needs to change the value manually. This task is accomplished by issuing Operator Commands in the Operate program where the operator can type in new data or select a command. When this data source is selected, a SET button appears next to the database point variable (for example, level) in the Tank Detail. In the Point Monitor display, a modify button appears.

Entering an Operator Command sends the command directly to the FMDataManager. FMDataManager immediately processes an Operator command and issues the command to the appropriate destination based on point configuration.

Operator Command requests are checked against the permissions assigned to the User Group. If the command cannot be completed due to security or other reasons, the system displays an operator message window describing why the command is disallowed.

CommManager

The Comm option enables you to connect to an external field device. Depending on the point data format and variable type, only some points can be assigned to the I/O connections. After selecting the Comm option, the Communications Interface Configuration window appears. This window lists all the interfaces available on the selected system. You can also set a Deadband to filter out minor changes.

Once an interface is selected, click I/O Point to view the I/O connections. Only I/O connections compatible with the point data format and engineering units configuration are displayed.

> Note For Deadband by source, if the source is Comm Input, you can only assign a translation on the Details tab. You cannot assign it on the source input tab because the field is unavailable. The translation on the Details tab occurs AFTER the deadband is applied. Translation configured on the Source Assignments tab occurs BEFORE THE deadband is applied.

For more details on Comm connections, see the Communications section of this manual.

Calculated Value

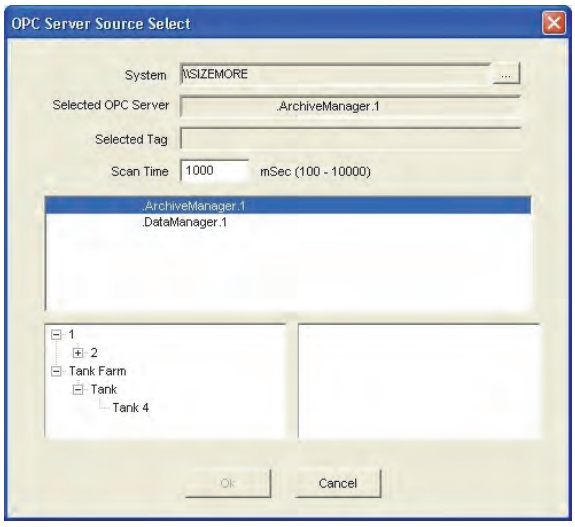
This option defines that FuelsManager should calculate this value. This option is only available for tank point variables that can be calculated (i.e. volume, mass etc.). It is not available for variables that must be measured or manually entered (i.e. Level or Temperature).

Local Input

This data source option defines the value to be connected to another database point and is only available for the Tank Point variable – Ambient Temperature. You can also set a Deadband to filter out minor changes.

OPC

The OPC option also allows you to connect to an external field device, using a Varec or third-party OPC server. The hierarchy of tags available depends on the OPC server selected. You can also set a Deadband to filter out minor changes. After selecting the OPC option, the OPC Server Source select window appears and is shown below.



Within this window, the System and Selected Servers are displayed in non-editable fields. Below these, the Scan Time can be entered to set the update rate and the version of OPC can be selected. Below these, a list containing available OPC servers is displayed. When a server is selected from this list, the system displays a tree view of the different OPC tags associated with the OPC server selected. For step-by-step instructions on how to Select an OPC server data source refer to 'Process Data Information'.

Data Format

Note You must configure the data format correctly for the range of data expected. Attempting to write a value that it too large for the data format defined results in truncation of the value and possible misinterpretation of the data.

FuelsManager supports several data formats for storage of data. Selecting a data format only applies to Input and Output points. Tank points have a predefined formats.

Each numerical data format has a default minimum and maximum value as listed in the Glossary. These values become the limits used for bar graphs, trends, and Operator Command entries. Refer to the Scale Limits section for more information.

If the data format is Coded Variable, a command modifier may be assigned to the point. For more information on Modifiers, refer to the Modifier Assignment section.

Note For a list of the available formats, refer to the Glossary.

Modifier Assignment

If the Coded Variable type is selected during configuration, you can assign modifiers to the point. Modifiers are sets of coded variables grouped together to be used as commands issued by the operator. The On/Off and Open/Close modifiers are examples. The FuelsManager System contains a list of predefined modifiers, a list of these modifiers can be found in the Glossary.

Alarms and Events

An Alarm Process defines the alarm limits of a point's value. If the value exceeds or falls below these defined alarm limits, an alarm occurs in the database. The alarm is then displayed in the Operate program.

Event Processes occur if the point's numeric value changes by a specified amount or if a command is issued. Refer to the Administering Alarms section.

Tag Category

Each database point can be assigned Tag Category, which works with the Security module to determine the level of access for the viewing and changing of database point values.

The Tag Category can be set to determine which database points may be viewed or modified by a user or operator. When setting up the Security module, all FuelsManager users are placed into an appropriate User Group (operators, administrator, etc.) and each User Group is assigned a Tag Category. Refer to the Security documentation for further information.

OPC Server Support

OPC server support in FuelsManager provides:

- Collection of field data from remote I/O, PLC, and other devices via Varec or 3rd party OPC servers.
- Access to measured and calculated tank data via LAN.
- An interface to host systems (DCS), which provide an OPC client.
- Easy configuration of interchanged data using one window.

What is OPC?

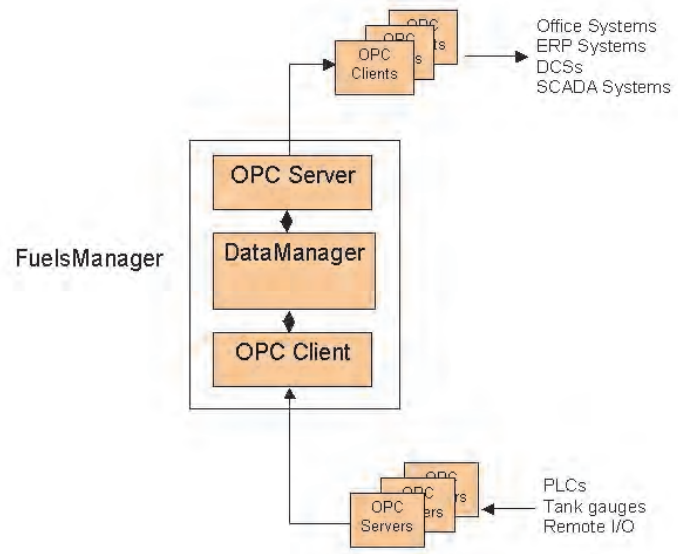
OPC (OLE for Process Control) is an open technical specification that defines a set of standard interfaces based on Microsoft's OLE/COM technology. The standards are defined and maintained by the OPC Foundation--an industry group with over 300 members from around the world, including nearly all of the world's major providers of control systems, instrumentation, and process control systems. The open OPC standard and the participation of the majority of the world's key automation and control providers makes OPC a powerful option in the inter operability field devices, automation systems and business/office applications.

OPC Data Access

FuelsManager implements the OPC Data Access specification used to move real-time data from PLC's, DCS's, and other control devices to HMI's and other display clients. FuelsManager currently support the following OPC specifications.

- OPC Data Access v1.0 (OPC DA 1.0)
- OPC Data Access v2.05a (OPC DA 2.05a)

The OPC DA specification defines interfaces for both OPC clients and OPC servers. Typically clients are HMI or other data gathering / display programs, client applications can browse OPC servers and allow you to select which OPC tags the client will read. OPC servers typically provide communications to/from devices further down the system hierarchy. OPC servers encapsulate the specific details of talking to the device(s) and provide a well defined set of OPC tags that the client can connect to. FuelsManager can operate simultaneously as both an OPC client and OPC server. FuelsManager can be an OPC client and communicate with OPC server for Tank Gauges, PLC's and other remote I/O to gather data from the field. At the same time FuelsManager can be providing data to DCS's and other business systems via its OPC server interface.



OPC Server Tags

FuelsManager's OPC server exposes all database points created in the FuelsManager real time database to OPC clients. The exact structure of the OPC tags depends on the database structure defined for your project. Also, the method for browsing and selecting the tags depend on the OPC client software being used. The dialog below shows the OPC tag structure as seen via the industry standard Matrikon OPC explorer client.

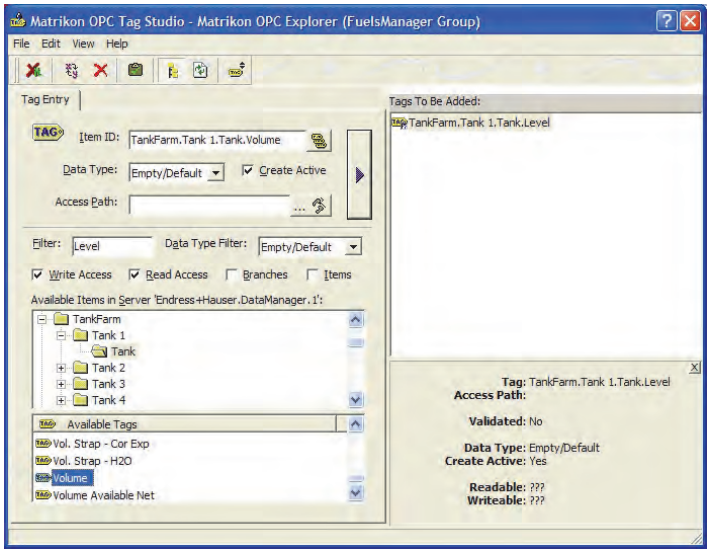


Figure 5-1: Matrikon OPC Tag Studio dialog

Supported client and server interface

- OPC Data Access (DA) v1.0
- OPC Data Access (DA) v.2.05a

The OPC standard also supports an interface designed to browse and select database tags for which data is exchanged. This function allows developers of OPC clients to provide an interface to browse and select point variables from the in FuelsManager database.

Setting the Number of Database Levels

FuelsManager stores real-time data in units called "points". Points are arranged in a tree-like structure with up to four levels. The default, and the most popular selection, is three levels.

> Caution Using the Registry Editor incorrectly can cause serious problems that may require you to reinstall your operating system. Varec, Inc. cannot guarantee that problems resulting from the incorrect use of the Registry Editor can be resolved. Use the Registry Editor at your own risk.

Also, a combined maximum of four bytes is available for the four database levels.

> Note To have any effect, this procedure must be executed before the FuelsManager database is configured.

1. On the Windows Start menu, click Run.
2. Type regedit in the Open field.
3. Click OK. The Registry Editor window opens.
4. In the treeview, select HKEY_LOCAL_MACHINE.
5. Double-click the following keys in sequence:
   SOFTWARE > FuelsManager > DataManager > Default Level

   The Default Level subkey contains the number of levels available and the field width of each level. Database fields are arranged from broad (Level X) to specific (Level 0). Unused database levels contain a "0" as the data value. For example, the illustration shows settings for a three-level database. Levels 0, 1, and 2 are assigned values and the bFieldWidth_3 is assigned to 0.
6. Assign a field width for each database level:
   a. Double-click on the appropriate bFieldWidth_n subkey that you will use. The DWORD editor window opens.
   b. Enter a field width value, up to a combined maximum of 4 bytes. This is a hexadecimal value.
   c. Click OK.
7. Double-click bNumberLevels. The DWORD editor window opens. Enter the number of levels (1 - 4) and then click OK.
8. Close the Registry Editor.

Creating Database Points

The following section defines the procedure necessary to create any type of database point. This procedure is common to all point types, for specific information about input & output points, triggered, or tank points refer to the following sections.

1. From the FuelsManager Configuration application Database menu, select the Points command and the Database Edit window appears.
2. In the Database Edit window, click New to create a new point, the Add Point to Database window appears.

3. Enter the level(s) names used to define the new point. Depending on which level you selected, the higher levels appear in the window. Each point must be unique within the system.
4. Under Point Type, select either Tank, Input, Output, or Triggered.
5. Click Add.
6. The Database Edit window appears if you selected a Tank point, follow the appropriate procedure to create a Tank point. For a description of the Add Point to Database and Database Edit window refer to the tables on the following pages.
7. The Edit Point window appears if you selected an Input or Output point. Follow the appropriate procedure to create an Input and Output point.
8. The Edit point window appears if you selected a Triggered Point. Follow the appropriate procedure to create Triggered point.

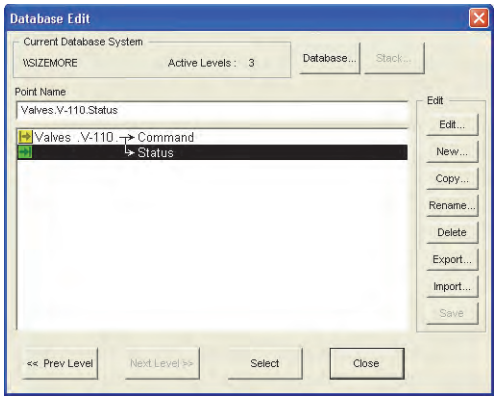


Figure 5-2: Top - Add Point to Database window

Figure 5-3: Bottom - Database edit window

Database Edit window	
CURRENT DATABASE SYSTEM	The Current Database System displays the system database on which the Database Point list is based
ACTIVE LEVELS	The Active Levels field displays the number of database tag levels for the selected database
DATABASE BUTTON	The Database button allows you to select an alternate FuelsManager database to configure
POINT NAME AND POINT LIST	The Point Name and the Point List display the tagname for the currently selected database point. The icon at the left of the point list defines the type of point. Users can search for known database point names by typing in the tagname in the Point Name field

Database Edit window	
PREV LEVEL AND NEXT LEVEL	The Prev Level and Next Level buttons allow you to navigate up and down through the FuelsManager database tree. You can also move down to the next level by double-clicking on the point in the point list
SELECT	The Select button picks the current point and closes the Database Edit window. This option is only applicable when the Database Edit dialog is opened from Operate or CommManager
CLOSE	The Close button closes the Database Edit window
EDIT	The Edit button opens the Edit Point window for the selected point. The format of the Edit point window differs depending on the type of point selected
NEW	The New button opens the Add Point window, allowing you to select the type of database point to be created
COPY	The Copy button opens the Point Copy / Rename window, allowing you to either make a copy of the selected point or rename the selected point
DELETE	The Delete button deletes the selected point
EXPORT	The Export button opens the Import / Export Data Type window, allowing you to select which particular data is to be exported to a CSV formatted file
IMPORT	The Import button opens the Import / Export Data Type window, allowing you to select which particular data is to be import from a CSV formatted file

Add Point to Database window	
WINDOW TITLE	The title of the window displays the Current Database System to which the point will be added
ACTIVE TAG LEVELS	The Active Levels field displays the number of database tag levels for the selected database
LEVEL 2, 1, 0	The Level 2, Level 1 and Level 1 fields allow you to enter the database tagname for the point to be created. Levels 2 or 1 will default to the database level already selected in the Database Edit window (if any) Note! The example window shows a three level database, an alternate window exists for four level databases. For databases with less than three levels the Level 2 or Level 1 fields will be disabled
POINT TYPE	The point type group allows you to select the type of point to be created. refer to the previous descriptions of the different types points

Creating Input and Output Points

An Input Point contains data received from field equipment, database calculations or another FuelsManager database. Both types of points require an input source but, you only select an output destination for the Output point.

> Note You must first select a point format before the other attributes can be addressed. Once selected, the default minimum and maximum values appear in the Minimum and Maximum Value edit boxes if the format is numeric.

1. Continued from the previous instructions, Creating Database Points
2. In the Edit Point window select the following:
   - Data format
   - Data source(s)
   - Engineering units
   - Other parameters

   For a description of these attributes, refer to the Edit Point window–key field explanations table at the end of this section, the brief instructions below, or the specific section relating to that topic.
3. From the Edit Point window – Type in the Description of the point.
4. From the Edit Point window – Select a Tag Category, if applicable and select whether you want to display quality data with the point.
5. If necessary, enter applicable Variable Format, Details, and Input Source information. See sections below and the Edit Point window table for more information.

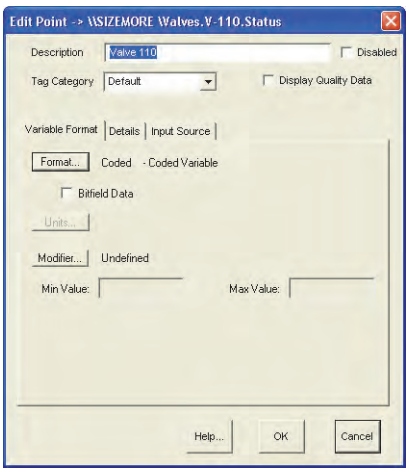
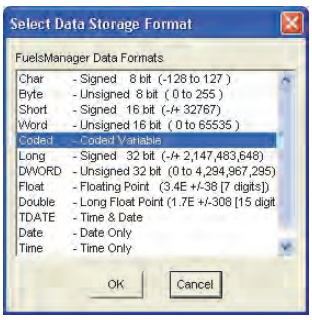


Figure 5-4: Edit Point window (input/Output)

Entering Variable Format information for an input or output point

1. From the Edit Point window, Variable Format tab, click Format to select the data storage format. The Select Data Storage Format window appears.
2. Make the Data Storage format selection and click OK to return to the Edit Point dialog.
3. You can select to use Bitfield Data for the point.
4. Or click the Units button to display the Select Engineering Units dialog to use for the point. Just select the appropriate type, unit, and click OK to return to the Edit Point dialog.



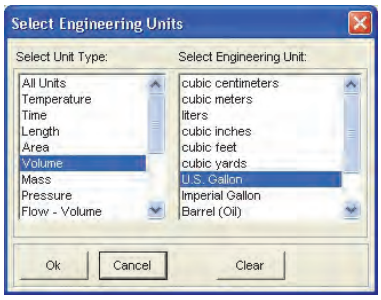


Figure 5-5: Left - Select Data Storage Format window

Figure 5-6: Right - Select Engineering Units window

1. If needed, you can select a modifier by clicking the Modifier button.
2. Select the appropriate Modifier and click OK to return to the Edit Point dialog.
3. If you are using a numeric format, you can set the minimum and maximum value by entering the parameters in the Min. Value and Max. Value fields.

Entering Details for an input/output point

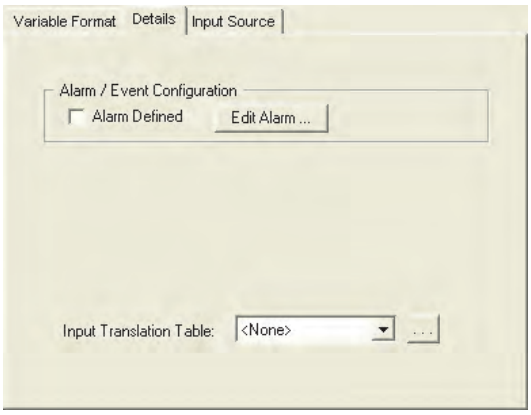


Figure 5-7: Details tab - Input/Output point

1. From the Edit Point window, select the Details tab.
2. You can make Alarm/Event Configurations for the input/output point here by clicking Edit Alarm and setting up alarms for the point. See Administering Alarms section for more details.
3. Click OK to return to the Edit Point dialog.
4. You can select an Input Translation Table by making a selection in the list. You can also view and edit translation tables by clicking the browse button.

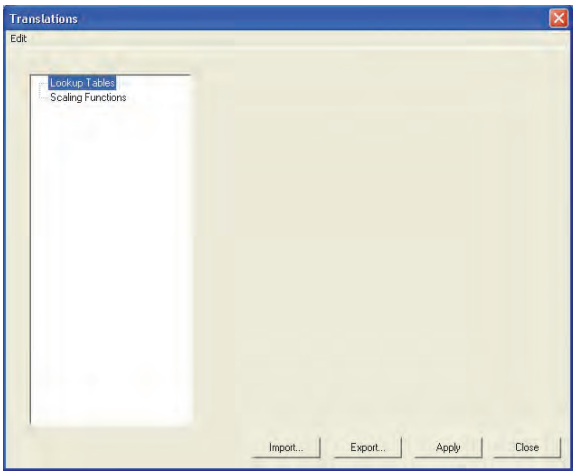


Figure 5-8: Translation dialog

Entering Input Sources for an input/output point

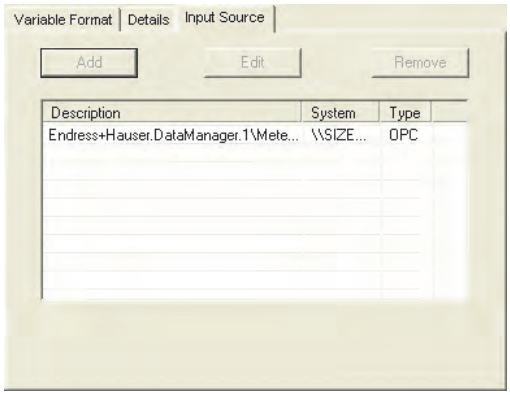


Figure 5-9: Input Source tab - Input/output point

1. From the Edit Point window - select the Input Source tab.
2. You can add input sources from a specific data source (Manual, Comm, or OPC).
3. Click Add to display the Select Data Source dialog and select any data source.
4. When finished, click OK to return to the Edit Point dialog.

   Note Changes made to the Data Source settings or the Alarm Definition cannot be discarded by the Cancel button, they have already been saved.

Creating and Editing Triggered Points

A Triggered Point serves as a monitor that views a single database point (such as an input point from a gauge). You can set the trigger point to send to an output point, OPC server or PLC when it observes a change in the point its monitoring.

> Note You must first select a point format before the other attributes can be addressed. Once selected, the default minimum and maximum values appear in the Minimum and Maximum Value edit boxes if the format is numeric.

1. Continued from the previous instructions, Creating Database Points.
2. In the Edit Point window select a data format, data source(s), engineering units, and other parameters. For a description of these attributes, refer to the Edit Point window – key field explanations table at the end of this section, the brief instructions below, or the specific section relating to that topic.
3. From the Edit Point window – Type in the Description of the point.
4. From the Edit Point window – Select a Tag Category, if applicable and select whether you want to display quality data with the point.
5. If necessary, enter applicable Variable Format, Details, Output Destinations, and Input Source information. See sections below and the Edit Point window table for more information.

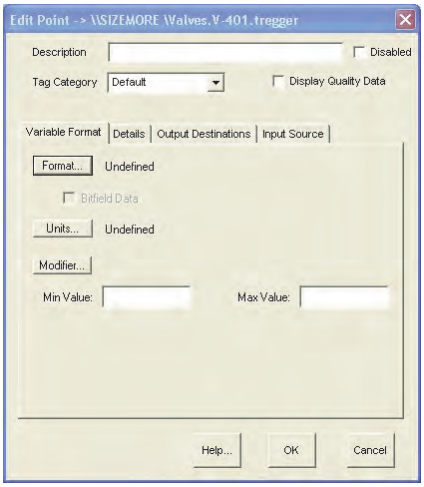


Figure 5-10: Edit Point window (Triggered)

Entering Variable Format information for a triggered point

1. From the Edit Point window, Variable Format tab – Click Format to select the data storage format. The Select Data Storage Format window appears.
2. Make the Data Storage format selection and click OK to return to the Edit Point dialog.
3. You can select to use Bitfield Data for the point.
4. Or click the Units button to display the Select Engineering Units dialog to use for the point. Just select the appropriate type, unit, and click OK to return to the Edit Point (triggered) dialog.
5. If needed, you can select a modifier by clicking the Modifier button.
6. Select the appropriate Modifier and click OK to return to the Edit Point dialog.
7. If you are using a numeric format, you can set the minimum and maximum value by entering the parameters in the Min. Value and Max. Value fields.

Entering Details for a triggered point

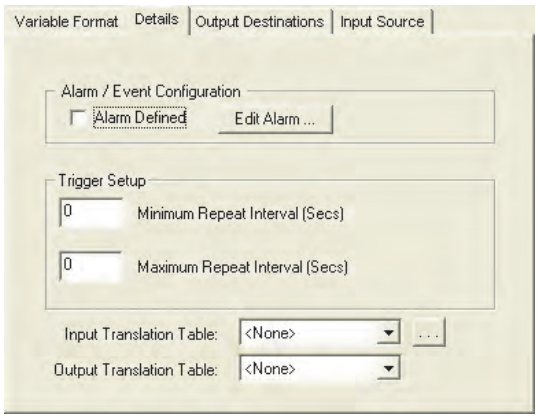


Figure 5-11: Details - triggered point

1. From the Edit Point window, select the Details tab.
2. You can make Alarm/Event configurations for the input/output point here by clicking Edit Alarm and setting up alarms for the point. Click OK to return to the Edit Point dialog.
3. In the Trigger Setup, you can set how frequently the triggered point checks the input source.
4. The input source and the output source can be set to different translation tables. Select the Input Translation Table and the Output Translation Table from the lists. You can also view and edit translation tables by clicking the browse button next to the input list.

Entering Output Destinations for a triggered point

For triggered points, the output destinations are the points that get populated as a result of the input source changing.

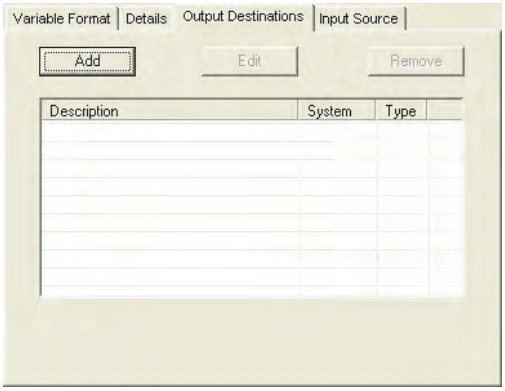


Figure 5-12: Output destinations - triggered point

1. From the Edit Point window - select the Output Destinations tab.
2. Click Add to display the Select Data Source dialog and select any data source as an output destination. You can add output destinations of up 32 to a specific data source destinations (Comm or OPC).
3. When finished selecting Data Source distinctions, click OK to return to the Edit Point dialog.

Entering Input Source for a triggered point

For triggered points, the input source is the point that the trigger point will monitor.

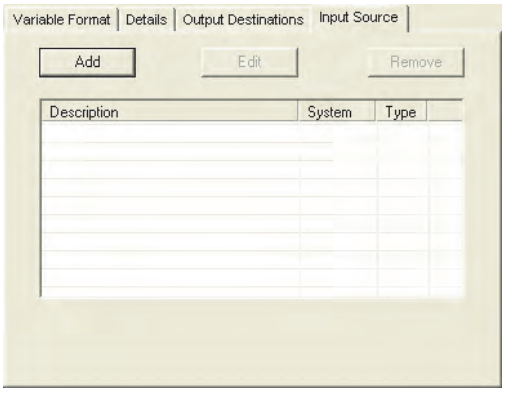


Figure 5-13: Input Source - triggered point

1. From the Edit Point window - select the Input Source tab.
2. You can add input sources from a specific data source (Manual, Comm, or OPC).
3. Click Add to display the Select Data Source dialog and select any data source.
4. When finished, click OK to return to the Edit Point dialog.

Edit Point Window

Edit Point window (Input/Output and Triggered Point)	
DESCRIPTION	Define a descriptive name to be use for the point. This name can be displayed on user graphics and reports, in addition, it forms part of the alarm entry if an alarm condition should occur
DISABLED	Disable the processing of a particular input / output point. The default is unchecked i.e. the point is processed.
TAG CATEGORY	Each database point can be assigned a Tag Category, which works with the Security module to determine the level of access for the viewing and changing of database point values
FORMAT	Configure the data format for the input / output point (for a list of possible data formats refer to the Glossary). If the data Storage format is a Coded Variable, the Modifier button becomes available within the Edit Point window. For all other options (except for Time and Date combinations), the Units button becomes available
BITFIELD DATA	Enable or disable FuelsManager processing of individual bits with this point
UNITS	Configure the engineering units for the input / output point (for a list of possible engineering units refer to the Glossary)

Edit Point window (Input/Output and Triggered Point)	
MODIFIER	Configure the command modifier to be assigned to the input / output point (for a list of standard modifiers refer to the Glossary). The Modifier button on only available for the Coded data type
MIN VALUE / MAX VALUE	Configure the minimum and maximum scaling limits for the input / output point
DISPLAY QUALITY DATA	Enable or disable the display of FuelsManager quality information (text superscripts displayed in graphic and reports that define from where the data was derived). The default setting is unchecked i.e. quality data is not displayed
ALARM EVENT CONFIGURATION	Alarm Defined - Open the Alarm Assignments window allowing you to define and assign alarm processes to the input / output point. (see Administering Alarms Edit Alarm - re-open the Alarm Assignments window allowing you to edit previously defined alarm processes for the input / output point. (see Administering Alarms). The Edit Alarm button is disabled if not alarms have been defined for this point
TRIGGER SETUP	(Triggered only)The minimum repeat interval defines the fastest period that any changes in the monitored value will be sent to the defined destination. The maximum repeat interval defines the period of which the monitored value will be sent to the destination, regardless of whether the value has changed. Setting either the minimum or maximum repeat intervals to zero disables the associated functionality
INPUT TRANSLATION TABLE	The translation table FuelsManager uses to decipher the data coming in from the input point
OUTPUT TRANSLATION TABLE (Triggered only)	The translation table FuelsManager uses before sending point data to an output destination
OUTPUT DESTINATIONS (Triggered Only)	A table listing the data sources that serve as the destinations for triggered points. You can add, edit and remove the source by clicking the appropriate button. Adding or editing the source opens the Select Data Source window, allowing you to define the sources of your data output point
INPUT SOURCE	A table listing the data source for the input point. You can add, edit and remove the input source bay clicking the appropriate button. Adding or editing the source opens the Select Data Source window, allowing you to define the source of data for the input / output point. Input points have only one Select button, whereas Output points have two Select buttons, one to define the destination for the output and one for the input source

Creating and Editing Tank Points

A Tank point includes predefined variables specifically designed for tank gauging applications, such as tank level, flow, and temperature. The Edit Tank Data window allows for specification of the Tank point attributes.

1. Continued from the previous Step-by Step instructions, Creating Database Points.
2. To configure each parameter for a tank point, work through the following sections that correspond to the tab fields within the Edit Tank Data window.

General Information

Follow the steps below to fill out the General tab:

1. Enter a description for the tank point.
2. Leave the Detail field empty if you want to use FuelsManager's default tank detail display, however, if you require an alternate tank detail display for this tank, enter the name of the tank detail.
3. Select the required engineering units for all variable types.
4. If required, enter the minimum and maximum scaling limits for all variable types.

   Note FuelsManager will give you the option to automatically re-scale the minimum/maximum, alarm, strapping tables and all other values if you change the engineering units.

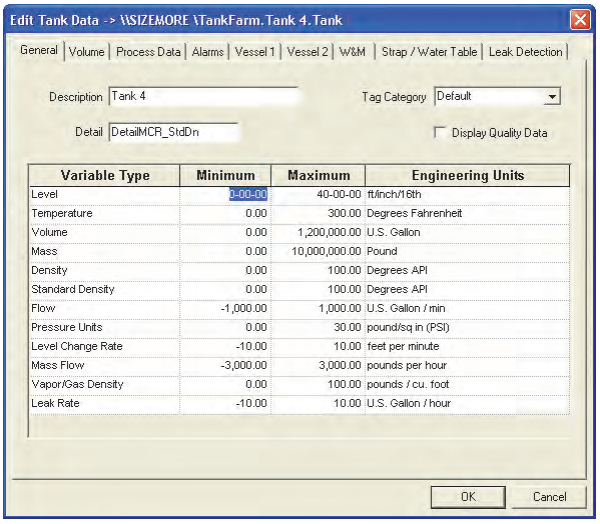


Figure 5-14: Edit Tank Data window - General tab

Edit Tank Data window - General tab	
DESCRIPTION	Enter a descriptive name to be used for the point. This name can be displayed on user graphics and reports, in addition, it forms part of the alarm entry if an alarm condition should occur.
TAG CATEGORY	Each database point can be assigned a Tag Category, which works with the Security module to determine the level of access for the viewing and changing of database point values.

Edit Tank Data window - General tab	
DISPLAY QUALITY DATA	Enable or disable the display of FuelsManager quality information (text superscripts displayed in graphic and reports that define from where the data was derived). The default setting is unchecked i.e. quality data is displayed.
DETAIL	Enter the name of the tank detail template (without the file extension) to be used for this tank. If this entry is left blank the default tank detail as defined in the registry will be used.
VARIABLE TYPE COLUMN	This column displays the types of tank point variables available. This data is for display purposes only.
MINIMUM / MAXIMUM COLUMNS	Edit the minimum and maximum scaling ranges for each of the variable types. The scaling ranges are used for bar graphs and trend plots and to define the ranges used by Operator Commands.
ENGINEERING UNITS COLUMN	To edit the units, click on the cell containing the units you want to change, the drop down list presented displays only units applicable to the variable type selected. Following a change in engineering units, FuelsManager will ask you if the scaling limit and alarm limits should be automatically modified to reflect the new units.

Volume Information

1. To select a product, click on the Product button.
2. Highlight a product from the Select A Product window and then click Select. Refer to the Adding Products section for further information on creating a product list.
3. If the selected product does not define the correction method to be used, select the required correction type and any optional correction techniques as required in the Special Rounding and Calculation Option sections.
4. As required, enter the Samples, Sample Time, and Deadband for the Flow, Level Rate, Mass Flow and Net Flow. There is no set formula to determine these values. You must consider the tank geometry, pipeline sizes and other factors before entering these parameters.

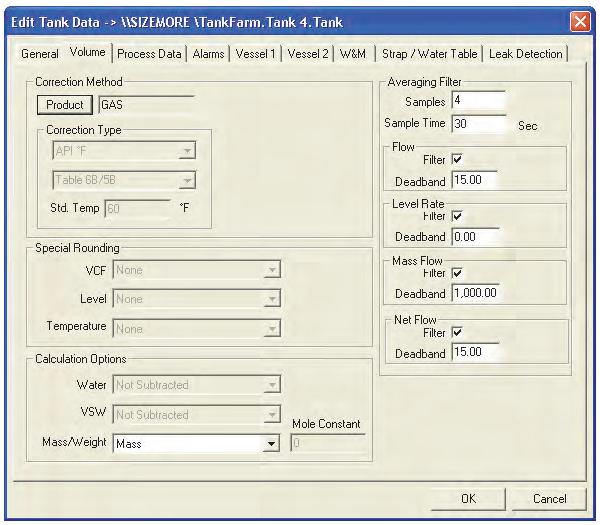
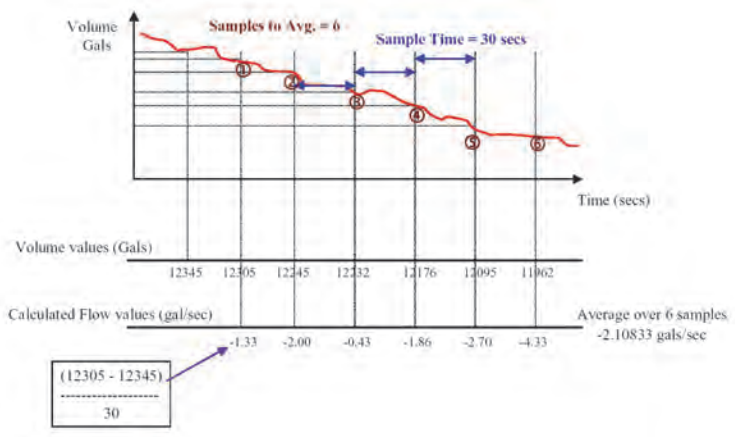


Figure 5-15: Edit Tank Data window - Volume tab

Edit Tank Data window - Volume tab	
PRODUCT	The Product button opens the Select A Product window, allowing you to pick the tank product from a list of pre-defined products, or add additional products
CORRECTION TYPE	These controls allow you to select of the correction algorithm to be used in the calculation of corrected volume for this tank. The selection of the major correction type (in the upper list box), restricts the minor correction types available (in the lower list box). In addition, if your system administrator associated a correction method with the product, the correction type is selection is made automatically based on the product chosen
SPECIAL ROUNDING GROUP	These parameters are only available when a Japanese volume correction method is selected in the correction type lists. These options allow you to define specific data rounding methods to be used in the volume correction calculation for VCF, Level and Temperature variables
CALCULATION OPTIONS GROUP	These parameters are only available when a Japanese volume correction method is selected in the correction type lists. These options allow you to define specific options as to when the water volume and volume due to%BSW are subtracted from product volume during the volume correction calculation. In addition the Mass/ Weight option allows you to define the method to be used for the calculation of product mass
AVERAGING FILTER GROUP	This group defines the number of samples, time between samples and the value below which changes in data are ignored. The parameters entered control how FuelsManager calculates the Flow, Level Rate, Mass Flow and Net Flow process variables

FuelsManager calculates flow by sampling the tank's volume and then calculating a rate of change volume (i.e., Gal / hr.). Users can tune how FuelsManager calculates this flow rate by the Sample Rate, Sample Size, and Deadband parameters on the General tab.

FuelsManager will sample the volume at the rate defined by the sample time parameter, calculate a flow rate based on this volume change, then average the individual flow rates over the number of sample defined by the Samples parameter.



If FuelsManager calculates an individual flow rate that is below the deadband parameter, the value is treated as zero for the purposes of averaging the flow rate. Users should tune the deadband parameter such that normal gauge movements caused by product surface ripples or wind movement are not be considered in the flow average calculation.

Process Data Information

1. Click on the appropriate button under the Source column to select the Data Source as required.
2. The Select Data Source window appears.
3. Click one of the buttons, Clear, Manual, Comm, Calc, Local or OPC in order to set the required data source.
4. Repeat to change the source for any other variable as required.

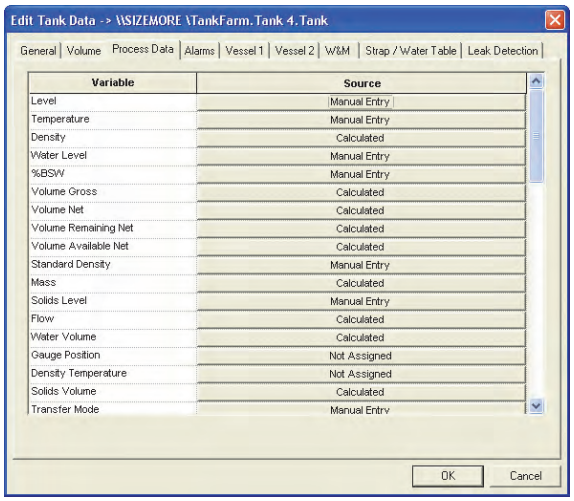


Figure 5-16: Edit Tank Data window - Process Data tab

Edit Tank Data window - Process Data tab	
VARIABLE COLUMN	This column displays the tank point process variable name. This column is for display only.
SOURCE COLUMN	This column displays the current Data Source for the particular tank process variable. Clicking on a particular Source opens the Select Data Source window, where the source can be changed.

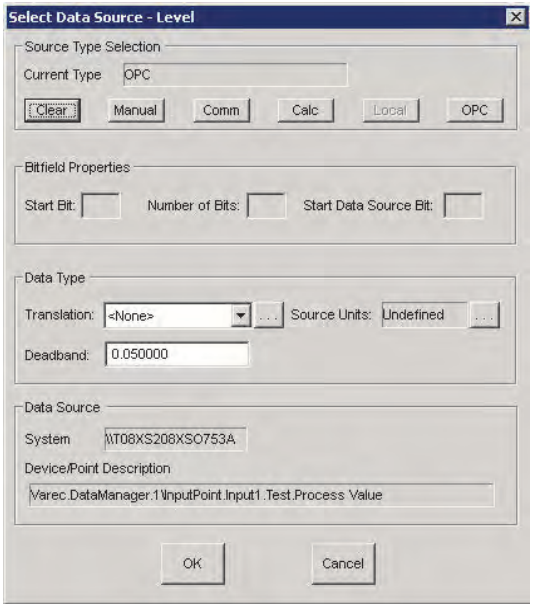


Figure 5-17: Select Data Source window

When a new Tank Point is created, FuelsManager sets the default Data Source's to the most common settings, however, the Data Sources for Level and Temperature are left unassigned. This means that you will have to assign data sources for level and temperature, but will not have to modify all the data sources for the tank point.

Alarm Information

1. Click the Gauge Alarm button to set a Global Alarm Definition to be used for the tank point.
2. Global Alarm Definitions window appears.
3. In the Global Alarm Definitions window either select an existing alarm definition or click New to create a new alarm definition. Typically the required alarm definitions have already been created - see Building an Alarm Process for more information.
4. In the Edit Tank Data window, enter the required alarm setpoints for the tank point.

   Note In addition to the Level alarms defined on the Edit Tank Data - Alarms tab, FuelsManager supports a Minimum and Maximum Operating level alarm. Selecting the 'User Defined' option for the Minimum and Maximum fill parameter on the Edit Tank Data - Vessel tab, enables these alarms.

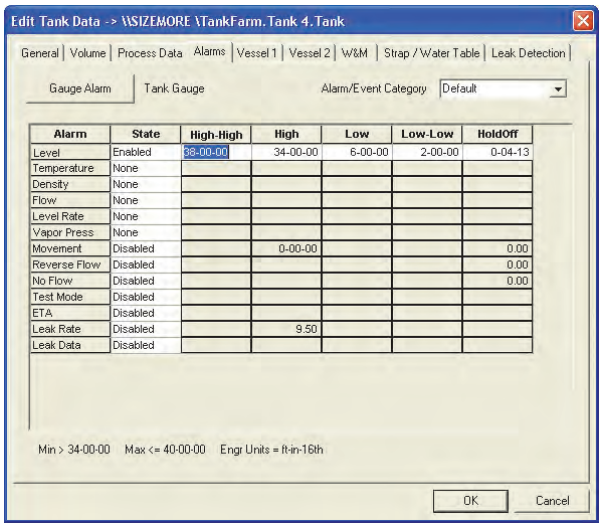


Figure 5-18: Edit Tank Data window – Alarms tab

Edit Tank Data window - Alarms tab	
GAUGE ALARMS	This button opens the Global Alarm Definitions window, allowing selection of the alarm definition to be associated with the tank point.
ALARM/EVENT CATEGORY	The Alarm Event category selection box allows selection of the appropriate pre-defined alarm security category.
ALARM COLUMN	This column displays the available tank alarms. This column is for display only.
STATE COLUMN	This column displays the current status of all available tank alarms. In addition by clicking on the appropriate cell in this column you can change the state of the alarms. Available states are: Disabled – Alarm limits are not cleared but no alarms of this type will be activated Enabled – Alarm limits are shown and alarms are processed by FuelsManager. None – Alarm limits are cleared and no alarms of this type will be activated.
HIGH-HIGH COLUMN	This column displays the current High-High alarm limit. In addition, by clicking on the appropriate cell in this column you can change the High-High alarm limit. High-High alarm limits are available for Level and Temperature process variables only.
HIGH COLUMN	This column displays the current High alarm limit. In addition, by clicking on the appropriate cell in this column you can change the High alarm limit. High alarm limits are available for Level, Temperature, Density, Flow, Level Rate, and Vapor Pressure process variables. Also the High limit is available for the Movement alarm, in this case the High limit value defines how much the tank level / volume has to move before an illegal movement alarm is activated.

Edit Tank Data window - Alarms tab	
LOW COLUMN	This column displays the current Low alarm limit. In addition, by clicking on the appropriate cell in this column you can change the Low alarm limit. Low alarm limits are available for Level, Temperature, Density, Flow, Level Rate, and Vapor Pressure process variables.
LOW-LOW COLUMN	This column displays the current Low-Low alarm limit. In addition, by clicking on the appropriate cell in this column you can change the Low-Low alarm limit. Low-Low alarm limits are available for Level and Temperature process variables only.
HOLDOFF COLUMN	This column displays the current alarm hold off value (sometimes called deadband or hysteresis). In addition, by clicking on the appropriate cell in this column you can change the Hold off alarm value. This value defines the amount by which the alarm limit must be cleared before the alarm is deactivated. For example, if the High level alarm setpoint is 10 and the level alarm hold off is 1, the level must return to a value of 9 before the High level alarm is deactivated. Hold off parameters are available for Level, Temperature, Density, Flow, Level Rate, and Vapor Pressure process variables. Also, a time hold off value is available for the Movement, Reverse Flow and No Flow alarms.

To assist you when entering alarm limit information, the Edit Tank Data – Alarm window displays the minimum and maximum available values for each alarm limit, along with the applicable engineering units.In addition, when a new tank point is created the Level Alarms are automatically enabled and the alarm limits are set to 95%, 85%, 15% and 5%.

Other alarm types

Several additional alarms exist for each tank however these are not configured from the Alarms Page. These alarms are defined in the Tank Digital Global Alarm Definition. The default Tank Digital Alarms include:

- Database Configuration
- Tank Calculation Error
- Strap table Error
- API Correction Error
- Critical Zone
- Transfer Advisory Setpoint
- Transfer Advisory Shutdown
- Specialized alarms

These can be edited and applied to all tanks in the system. However you cannot edit these alarms on a tank by tank basis.

Specialized alarms

The following tank alarms have special meaning, that may not be as easy to understand as the simple level, temperature or process alarms. For this reason a brief description of their functionality is given in the following table, for more information please refer to the Glossary.

Edit Tank Data window - Alarm tab - Specialized Alarms	
MOVEMENT	When the Tank Mode is set to Stopped, a Stop Level is established at the current tank level. If the tank level deviates from the Stop Level by the High Setpoint, a Movement Alarm is generated

Edit Tank Data window - Alarm tab - Specialized Alarms	
REVERSE FLOW	When the Tank Mode is Fill and the Flow is negative or the Tank Mode is Empty and the Flow is positive, a Reverse Flow Alarm is generated
NO FLOW	When the Tank Mode is set to Fill, Empty or Run, a Timer is started. If the time exceeds the value configured under the No Flow Alarm Hold off parameter and the flow is still zero, a no Flow alarm is generated. The time is reset whenever the flow value is not zero
TEST MODE	When the Tank Mode is set to Testing, the Test Mode alarm is generated.
ETA (ESTIMATED TIME OF ARRIVAL)	For each level alarm limit, and ETA is calculated. Whenever the ETA is less than the Transfer Advisory Setpoint, the corresponding ETA alarm is generated. ETA alarms are suppressed when the ETA time is 0

Vessel Information (Vessel 1 & Vessel 2 Tabs)

The point information concerning the vessel is divided among two tabs--Vessel 1 & Vessel 2. Vessel 1 keeps the physical statistics of a tank along with gauging, pressure, and other information to ensure accurate use in FuelsManager. Vessel 2 contains transfer limit settings, gauge assignments, and float characteristics.

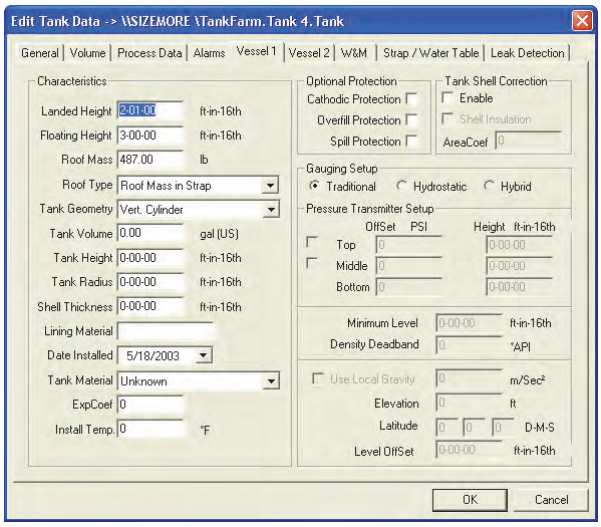


Figure 5-19: Edit Tank Data window - Vessel 1 tab

Entering Vessel 1 information

Note For more details on using Hydrostatic or Hybrid tank calculations, see the Calculation Methods chapter.

1. Click the Vessel 1 tab.
2. Enter information about the basic physical Characteristics--Landed Height, Floating Height, Roof Mass, Roof Type, Tank Geometry, Tank Volume, Tank Height, Tank Radius, Shell Thickness, Lining Material, Date Installed, Tank Material, ExpCoef, and Install Temperature.
3. Under Optional Protection, indicate any Cathodic, Overfill, or Spill protection that is used with the tank.

4. Under Tank Shell Correction, you can enable and indicate any Shell Insulation and area coefficient (if applicable).
5. Under Gauging Setup, you can set whether your gauging system uses Traditional, Hydrostatic or Hybrid setups.
6. If using either the Hydrostatic or Hybrid gauging setup, you must enter the bottom Pressure Transmitter Setup (Offset PSI & Height). You can also enable and enter the Top and Middle transmitter settings.
7. If using Hydrostatic or Hybrid gauging setup, you can enter the Minimum Level and Density Deadband.
8. You can select whether to use Local Gravity settings. Just check the Use Local Gravity check box and enter the m/Sec2.
9. You can also enter the Elevation in feet, and Latitude in Degrees, Minutes and Seconds. You can only enter Latitude if you are not using Local Gravity.
10. Enter the Level Offset.

Edit Tank Data window - Vessel 1 tab	
MAXIMUM FILL	This field allows you to configure the maximum safe level to which the tank can be filled. FuelsManager uses this value in the calculation of remaining and available volume(s). The maximum fill level can be: User Defined - user can enter any value High - Maximum fill level is the same as the high level alarm limit High-High - Maximum fill level is the same as the high-high level alarm limit Selecting the 'User Defined' option also enables the Maximum Operating limit level alarm. This alarm functions independently of the High and High-High alarms and is intended to give an additional stage of level alarm monitoring.
LANDED HEIGHT	This field allows configuration of the height at which the floating roof is fully landed on it legs. FuelsManager only uses this parameter if the list item 'Roof Mass not in Strap' is selected, otherwise this parameter is ignored
FLOATING HEIGHT	This field allows you to configure the height at which the floating roof is fully floating on the product. FuelsManager only uses this parameter if the list item 'Roof Mass not in Strap' is selected, otherwise this parameter is ignored
ROOF MASS	This field allows you to configure the weight of the floating roof. This value is used together with the Roof Type selection and the current density and strapping density values to calculate the volumetric effect of the floating roof

Edit Tank Data window - Vessel 1 tab	
ROOF TYPE	This field allows you to configure the type of floating roof, possible values are: No Tank Roof - No floating roof correction Fixed Roof - No floating roof correction Roof Mass in Strap - Roof mass is accounted for in the tank strapping table. Roof Mass not in Strap - Roof mass has not been included in the tank strapping table Kaiji-Kentei-Kyyokai - See the Tank Calculations chapter for more details. Only available if a 'Japan' Correction Type is selected on the Edit Tank Data Volume tab Sin-Nihon-Kentei-Kyyoukai1 - See the Tank Calculations chapter for more details Only available if a 'Japan' Correction Type is selected on the Edit Tank Data Volume tab Sin-Nihon-Kentei-Kyyoukai2 - See the Tank Calculations chapter for more details Only available if a 'Japan' Correction Type is selected on the Edit Tank Data Volume tab Sin-Nihon-Kentei-Kyyoukai3 - See the Tank Calculations chapter for more details Only available if a 'Japan' Correction Type is selected on the Edit Tank Data Volume tab
TANK GEOMETRY	This field allows you to configure the shape of the tank. FuelsManager uses this value to determine how to interpolate between strapping table points, possible values are: Vert. Cylinder; Horizontal Cylinder - End Caps; Horizontal Cylinder - Flat Ends; Standard Sphere; and Polynomial Sphere. Selecting Polynomial Sphere causes the strapping table tab of the tank configuration window to change to 'Polynomial Sphere'
TANK VOLUME	This field allows you to configure the total internal volume of the spherical tank. Used in the LPG calculation method
TANK HEIGHT	This field allows you to configure the total height of the sphere at the point at which the automatic tank gauge is installed. Used in the LPG calculation method
TANK RADIUS	This field allows you to configure the radius of the sphere. Used in the LPG calculation method
SHELL THICKNESS	This field allows you to configure the thickness of the sphere's shell. Used in the LPG calculation method
LINING MATERIAL	This field allows the configuration of the type of tank lining material. For reporting and information only
DATE INSTALLED	This field allows the configuration of the date the tank was installed or build. For reporting and information only
TANK MATERIAL	This field allows you to configure the material from which the tank shell is constructed. This field is only available if the Enable Correction option is checked. Used in tank shell correction calculation
EXP COEF	This field allows you to configure the material expansion coefficient used in the tank shell correction calculations. Manual entry of this value is not allowed except when the Tank Material is set to 'Other.' Used in tank shell correction calculation
INSTALL TEMP	This field allows the configuration of the ambient temperature when the tank was installed or built

Edit Tank Data window - Vessel 1 tab	
CATHODIC PROTECTION	This field denotes that the tank is fitted with cathodic protection. Used for reporting and information only
OVERFILL PROTECTION	This field denotes that the tank is fitted with overfill protection. Used for reporting and information only
SPILL PROTECTION	This field denotes that the tank is fitted with spill protection. Used for reporting and information only
ENABLE (TANK SHELL CORRECTION)	This field allows you to enable the compensation of the Net Std. volume for the thermal expansion effects of the tank shell
SHELL INSULATION	This field allows you to configure the tank shell correction method to use the insulated tank correction equation. This field is only available if the Enable Correction option is checked
AREACOEF	This field allows you to configure the shell area expansion coefficient used in the tank shell correction calculations. Manual entry of this value is not allowed except when the Tank Material is set to 'Other'
GAUGING SETUP – TRADITIONAL	This option configures the tank to use traditional level tank gauging techniques
GAUGING SETUP – HYDROSTATIC	This option configures the tank to use Hydrostatic tank gauging techniques
GAUGING SETUP – HYBRID	This option configures the tank to use Hybrid tank gauging techniques
PRESSURE TRANSMITTER SETUP – TOP	These parameters define the position and offset for the Top pressure transmitter in Hydrostatic/Hybrid tank calculations
PRESSURE TRANSMITTER SETUP – MIDDLE	These parameters define the position and offset for the Middle pressure transmitter in Hydrostatic/Hybrid tank calculations
PRESSURE TRANSMITTER SETUP – BOTTOM	These parameters define the position and offset for the Bottom pressure transmitter in Hydrostatic/Hybrid tank calculations
MINIMUM LEVEL	This parameter defines the lowest level of which Hydrostatic/Hybrid tank calculations can be performed
DENSITY DEADBAND	This parameter defines the minimum change in density that will cause the Hydrostatic/Hybrid tank calculations to be executed
USE LOCAL GRAVITY	Enable the entry of the Earth's gravity, in m/sec2, at the tank's specification. Used in Hydrostatic/Hybrid calculations
ELEVATION	Defines the elevation above sea level at the tanks specific location, used in Hydrostatic/Hybrid calculations
LATITUDE	Defines the Latitude (in deg, mins, & sec) at the tank's specific location, used in Hydrostatic/Hybrid calculations
LEVEL OFFSET	Defines the offset value to be applied to the Level calculation as part of the Hydrostatic calculations

Entering Vessel 2 information

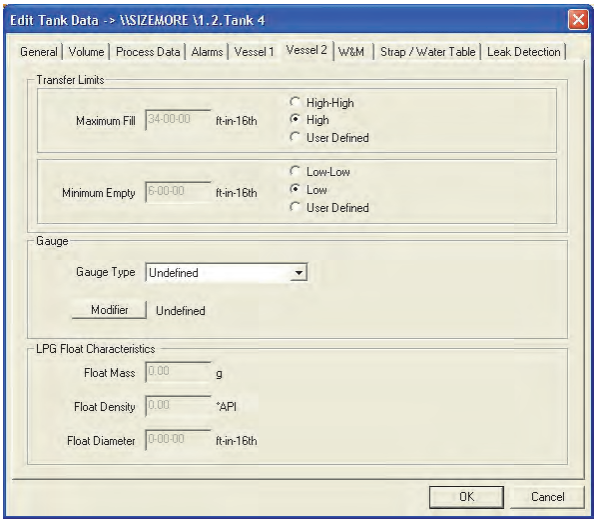


Figure 5-20: Edit Tank Data window - Vessel 1 tab

1. Click the Vessel 2 tab.
2. Under Transfer Limits, you can set the Maximum Fill volume for the tank. You can select from the pre-set amounts of High-High or High, or select User Defined and enter the appropriate amount.
3. Also under Transfer Limits you can set the Maximum Empty volume for the tank. You can select from the pre-set amounts of Low-Low and Low, or select User Defined and enter the appropriate amount.
4. Under Gauge, you can select from the standard Gauge Type list and enter the appropriate commands available from the gauge by clicking the Modifier button and selecting from the list.
5. Under LPG Float Characteristics, you can enter the Float Mass, Float Density and Float Diameter so FuelsManager can compensate for the size of the LPG float. These fields are only available when the LPG volume correction method is selected on the Volume tab.

Edit Tank Data window - Vessel 2 tab	
MAXIMUM FILL	This field allows you to configure the maximum safe level to which the tank can be filled. FuelsManager uses this value in the calculation of remaining and available volume(s). The maximum fill level can be: User Defined - user can enter any value. High - Maximum fill level is the same as the high level alarm limit High-High - Maximum fill level is the same as the high-high level alarm limit. Selecting the 'User Defined' option also enables the Maximum Operating limit level alarm. This alarm functions independently of the High and High-High alarms and is intended to give an additional stage of level alarm monitoring.

Edit Tank Data window - Vessel 2 tab	
MINIMUM EMPTY	This field allows you to configure the minimum safe level to which the tank can be drained. FuelsManager uses this value in the calculation of remaining and available volume(s). The minimum empty level can be: User Defined – User can enter any value. Low – Minimum empty level is the same as the low level alarm limit. Low–Low – Minimum empty level is the same as the low–low level alarm limit. Selecting the 'User Defined' option also enables the Minimum Operating limit level alarm. This alarm functions independently of the Low and Low– alarms and is intended to give an additional stage of level alarm monitoring.
GAUGE TYPE	This field allows you to configure the type of automatic tank gauge used by this tank. FuelsManager uses this parameter for display only.
MODIFIER	This field allows you to configure the commands available to the operator for a particular automatic tank gauge. For example, Raise / Lower.
FLOAT MASS	This field allows you to configure the mass of the float, FuelsManager uses this to compensate the level value reported by the tank gauge. Used when LPG volume calculation method is selected
FLOAT DENSITY	This field allows you to configure the density of the float. FuelsManager uses this to compensate the level value reported by the tank gauge. Used when LPG volume calculation method is selected
FLOAT DIAMETER	This field allows you to configure the diameter of the float. FuelsManager uses this to compensate the level value reported by the tank gauge. Used when LPG volume calculation method is selected

Polynomial Sphere Information

The Polynomial Sphere tab replaces the Strapping table tab when you select the Tank Geometry option – Polynomial Sphere.

Note FuelsManager performs all polynomial sphere calculations in millimeters. You must enter the Correction Level in millimeters to obtain accurate polynomial sphere calculations.

1. Review the Level/Constant grid values.
2. Enter the required Correction Level and P Constant.

   Note Enter the Correction Level in millimeters.

3. Review the values for Density and Temperature.

   Note For detailed calculation method used, see the Polynomial Sphere section of the Tank Calculations section.

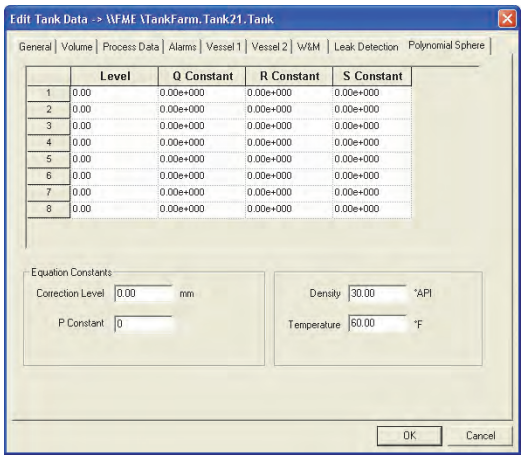


Figure 5-21: Edit Tank Data window – Polynomial Sphere tab

Edit Tank Data window - Polynomial Sphere tab	
LEVEL & CONSTANT COLUMNS	These columns display the volumetric constants to be applied between the specified level ranges. The level column reflects the current engineering units for the tank.
CORRECTION LEVEL	This field allows you to enter the level offset (*in millimeters*) to be used to correct the level process variable for the measurement error due to the low temperatures in tanks containing liquid hydrocarbons.
P CONSTANT	This field allows you to enter the volumetric constant to be applied to all level gauge values, for more details please refer to the Tank Calculations chapter
DENSITY	This field allows you to edit the density at which polynomial sphere constants apply. This value is used in FuelsManager volume calculations.
TEMPERATURE	This field allows you to edit the temperature at which polynomial sphere constants apply. This value is used in FuelsManager volume calculations.

Weights & Measures Information

FuelsManager allows you to apply a software seal to a particular tank point. This provides a method of verifying the data associated with the tank point is weights and measures approved.

The W&M property tab in the Edit Tank Data window provides a list of Calibration Seals for a particular tank point variable. A check box indicates the state for the Tank Seal and each input Process Variable Seal.

> Note Each time the weights and measures Tank Seal Data is changed, the Seal ID is increased. This allows the weights and measures authority to know if seals have been removed and subsequently reapplied.

1. To change the desired Seal State, click in the Seal check box with the left mouse button.
2. The checkbox is ticked
3. Click the Update button.

4. If any Seal State changes are checked, the prompt is for entry of the Weights & Measures Password. The Weights & Measures Password must be properly entered to effect setting Tag Seals.
5. Alternately the prompt is simply for confirmation.

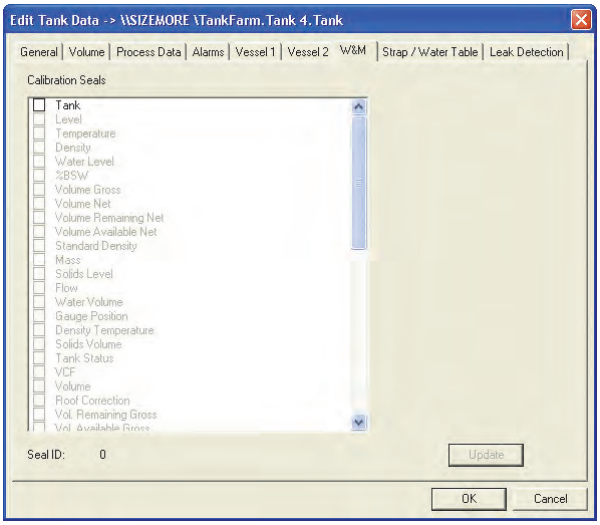


Figure 5-22: Edit Tank Data window - Weights & Measures tab

> Note For more information about weight and measure functions, see the Weight and Measure section of this manual.

Selecting the Tank parameter prevents modifications to any tank parameters that can effect the calculated volumes.

Selecting an individual parameter prevents modification to the data source for that particular variable.

Strapping/Water Table Information

> Note The Product Strapping Table can be configured in the registry to include or exclude the Water Volume.

FuelsManager allows each tank point to be configured with both a Product Strapping Table and a Water Table. Follow the steps below to fill out the Strap/Water Table information

> Note The Polynomial Sphere tab replaces the Strapping Table tab when you select the Tank Geometry option - Polynomial Sphere.

1. Select the Add or Insert button to enter the tank strapping table directly into the grid, or use the Import button to import strapping table data from a FuelsManager formatted strapping table text file (*.TST).
2. Choose either Strap Table or Water Table. The table grid display will adjust to either choice.
3. Enter the strapping table density and temperature in the Density and Temperature fields.
4. Select the strapping table type (innage or outage) in the Strap table Type group.

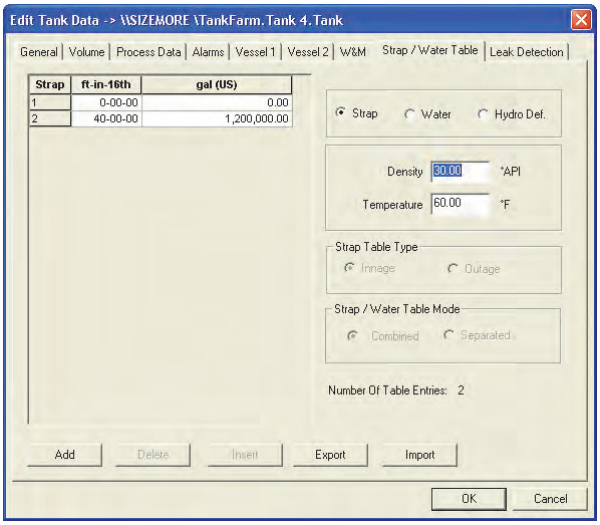


Figure 5-23: Edit Tank Data window – Strap/Water table tab

Edit Tank Data window - Strap/Water Table tab	
STRAPPING TABLE GRID COLUMNS	These columns display the current tank strapping table information; in addition, you can edit any particular entry by clicking on and editing the appropriate cell. The column headings reflect the current level and volume engineering units for the tank
STRAP TABLE, WATER TABLE, HYDRO DEF	This selection allows choice of the table type, and alters the table grid display to list either the Strap, Water, or Hydro definition tables. Selection of Water and Hydro Def tables will disable the Strap table Type fields
DENSITY	This field allows you to edit the strapping table density. This value is the density at which the strapping table was created and is used in FuelsManager volume calculations
TEMPERATURE	This field allows you to edit the strapping table temperature. This value is the temperature at which the strapping table was created and is used in FuelsManager volume calculations
ADD	This button allows you to add a new entry at the end of the strapping table
DELETE	This button removes the currently selected entry from the strapping table
INSERT	This button allows you to add a new entry at the currently selected position in the strapping table
EXPORT	This button allows you to export the tank strapping table to a proprietary formatted text file. This allows you to edit the information offline using 3rd party tools like Notepad
IMPORT	This button allows you to import a previously exported tank strapping table

Edit Tank Data window - Strap/Water Table tab	
STRAP TABLE TYPE	This group allows you to configure the type of strapping table to be used, either Innage or Outage. A tank may be converted from Innage to Outage by simply changing the selection in the Strap table Type. The system calculates the new Outage Strap table based on the Innage table and recalculates the new alarm setpoints. A tank may also be converted from Outage to Innage by the same process
INNAGE	The Innage option button is the default value for new tanks and measures the actual fluid in the tank, displaying the Level measurement values from low to high. When the Innage option is selected, the following applies: Alarm settings under the Alarm tab are recalculated to reflect your Innage selection: High-High - must be greater than High and activates when the tank level is equal to or greater than the setpoint. High - must be greater than Low but less than High-High and activates when the tank level is equal to or greater than the setpoint. Low - must be greater than Low-Low but less than High and activates when the tank level is equal to or less than the setpoint. Low-Low - must be less than Low and activates when the tank level is equal to or less than the setpoint. Volume calculations - are based on the Strap table
OUTAGE	The Outage option button measures the actual free space in the tank displaying the Level measurement value from high to low. When the Outage option is selected, the following applies: Alarm settings (In the Alarm tab) are recalculated to reflect your Outage selection: High-High - must be less than High and activates when the tank level is equal to or less than the setpoint. High - must be less than Low but greater than High-High and activates when the tank level is equal to or less than the setpoint. Low - must be less than Low-Low but greater than High and activates when the tank level is equal to or greater than the setpoint. Low-Low - must be greater than Low and activates when tank level is equal to or greater than the setpoint. Volume calculations - are based on the Strap table with the exception of Water Volume and Bottom Volume for Outage. These volumes are calculated as if the Strap table was an Innage table

Strap, Water and Hydro Definition Modes

FuelsManager can be configured to calculate gross volume by one of two different methods:

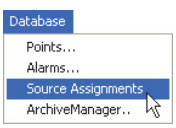
- Combined product and water tables
- Separated product and water tables

These selections control how the product and water tables overlap and how FuelsManager should interpret the volumes at the point where the two overlap. For more details, see the Product & Water Strapping Tables section of the Tank Calculations chapter.

Leak Detection

If your system has the Leak Detection feature installed, a Leak Detection tab appears on the Edit Tank Point window. For details on these configuration parameters, please refer to the Leak Detection section of this manual.

Assigning Data Sources



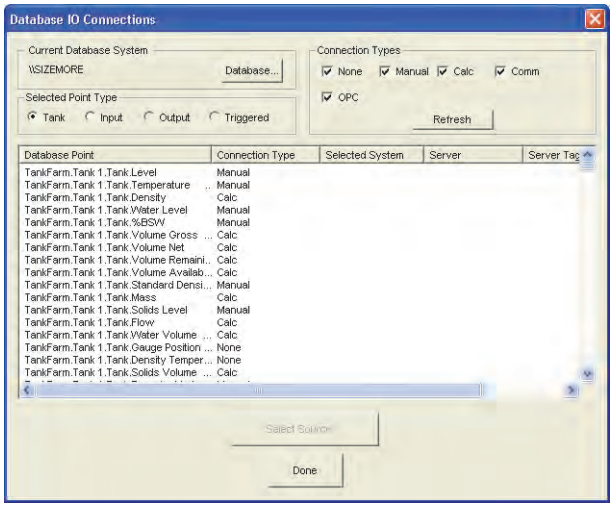


Figure 5-24: Left - Database menu select the Source Assignments command

Figure 5-25: Right - Database IO Connections window, for descriptions refer to the table opposite

FuelsManager provides access to all data point assignments in one window to simplify management of Points in a database.

Database IO Connections window	
CURRENT DATABASE SYSTEM	The Current Database System displays the name of the system that hosts the currently selected database.
DATABASE BUTTON	Clicking Database displays the Select FMDataManager Subsystem window to allow selection of another system's database
SELECTED POINT TYPES	This option buttons allows filtering of the point types appear in the Database Point list Tank Points - displays all tank points in the Current Database System Input Points - displays all input points in the Current Database System Output Points - displays all output points in the Current Database System Triggered Points - displays all triggered points in the Current Database System

Database IO Connections window	
CONNECTION TYPES	This option buttons allows filtering of the types of connections displayed on the Database Point list. None – displays all unassigned connections Manual – displays all manual data source assignments Calc – displays all calculated data source assignments Comm – displays all CommManager data source assignments OPC – displays all OPC Server data source assignments
SELECT SOURCE BUTTON	The Select Source button allows a data source to be assigned to a database point. Clicking on this button displays the Select Data Source window, and is only enabled when a Database Point has been selected.
REFRESH	The Refresh button the Database Point to be renewed based on the current options selected in the Selected Point Type and Connection Types options.

Opening the Database IO Connections Window

Note For a description of the Database IO Connections refer to the table below.

Note The Select Data Source dialog may also be opened directly from the Input, Output, Trigger or Tank Point edit dialog.

1. Open FuelsManager Configuration.
2. From the Database menu select the Source Assignments command.
3. The Database IO Connections window appears.
4. Select and then double click any database point shown.
5. The Select Data Source window appears.

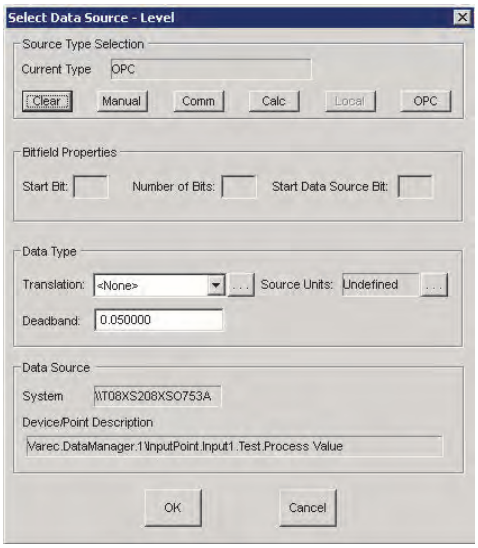


Figure 5-26: Select Data Source window

Note For details on Data Source types, see Point Attributes section.

Dialog Group	Button/Field	Description
Source Type Selection	Current Type	Displays the current Data Source type for this database point. Possible options--Clear, Manual, Comm, Calc, Local, OPC
Bitfield Properites(Only available the point is configured to process bitfield data)	Start Bit	Defines the first bit position in the database point that will be sent to the assigned I/O point
	Number of Bits	Defines the number of bits, starting with the Start bit, that will be sent to the I/O point
	Start Data Source Bit	Defines the first bit position in the assigned I/O point that the bits defined by the start bit and number of bits will be written to
Data Type	Translation	Translation or scaling table to be applied to this database point
	Source Units	Engineering units that the received data value will be expressed in
Data Source	System	System name that this point is assigned to
	Device/Point Description	Description of the device or I/O point that this database point is connected to

Select Data Source window - commands and settings	
CURRENT TYPES	This field displays the current data source type.
UN-ASSIGNED / CLEAR	Data Source is undefined, the data will be tagged as un-initialized. The Clear button un-assigns the data source.
MANUAL	The Manual button assigns the data source such that the operator will manually enter the value.
COMM	Data is to be received from the designated CommManager Input or outputted for output points. The Comm button opens the Communications Interface Configuration window, allowing you to connect the value of the point to external devices. Refer to the previous Data Source description section and the particular Communications Driver manual for procedures.
CALC	Data is to be updated by internal database calculation. The Calc button assigns the data source such that FuelsManager will calculate the data value for this point.
LOCAL	Data is to be received from another FMDataManager Point. The Local button opens the Database Edit window, allowing you to select another FuelsManager database point to be used as the data source for the point. This option is only available for the Tank Point - Ambient Temperature process variable.
OPC	Data is to be updated from the assigned OPC Server. Presently, output to an OPC server is not supported. The OPC button opens the OPC Server Configuration window, allowing you to select an OPC Server tag to be used as the data source for the point.

Note Varec is a OPC Foundation Member. For additional information on OPC visit - http://www.opcfoundation.org or contact a Varec representative.

Clearing data source

1. Open the Data Source window for the point you want to clear. See Opening the Database IO Connections window steps.
2. Check the Current Type field. If the field displays the message “Not Assigned,” then the data source is already clear and no action is needed.
3. If the Current Type field displays a different message, then click Clear. The “Not Assigned” message appears.
4. Click OK to close the Select Data Source dialog.

Selecting a Manual data source

1. Open the Data Source window for the point you set. See Opening the Database IO Connections window steps.
2. Click Manual. The Current Type changes to “Manual Entry”.
3. Click OK to close the Select Data Source dialog.

Selecting a Comm data source

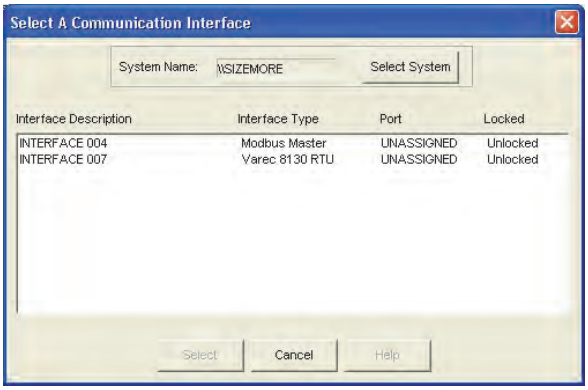


Figure 5-27: Select a Communication Interface dialog

Note The exact process for selecting the device and I/O point is specific to the interface selected.

1. Open the Data Source window for the point you want to clear. See Opening the Database IO Connections window steps.
2. Click Comm. The Select a Communication Interface window appears and lists all available Interfaces.
3. Select the Comm interface that you want to assign and select the device and I/O point from the selected interface.
4. Click OK to close the Select Data Source window.

Selecting an OPC data source

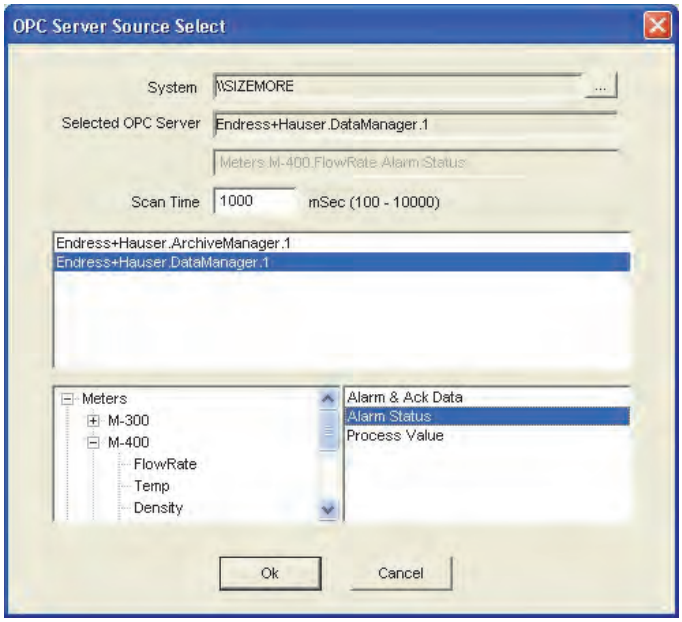


Figure 5-28: OPC Server Source Select dialog

1. Open the Data Source window for the point you want to assign. See Opening the Database IO Connections window steps.
2. Click OPC. The OPC Server Source Select window appears.
3. From the list, select the OPC server. The list below displays the points within that OPC source.
4. Click the + to open levels of the database and navigate to the specific data source point and select the point when it appears in the lower-right list.
5. Click OK to close the OPC Server Source Select window.
6. Click OK to close the Select Data Source window.

Selecting a Local data source

Note The local data source selection is only available for the Tank Point Ambient Temperature parameter.

1. Open the Data Source window for the point you want to clear. See Opening the Database IO Connections window steps.
2. Click Local, the Database Edit window opens.
3. Browse to the database point you want to assign and click Select.
4. Click OK to close the Select Data Source window.

Engineering Units Conversion

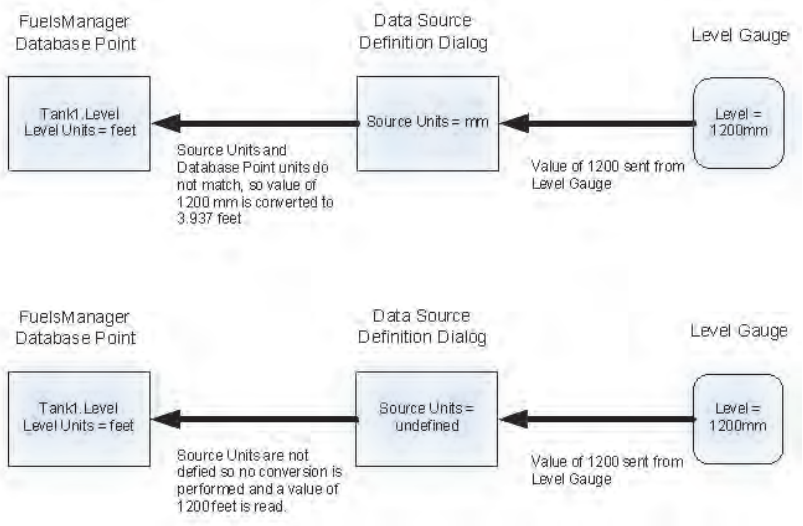
The Source Units defined on the Select Data Source window instructs FuelsManager what engineering units the data value being received from the I/O points are expressed in. So, if FuelsManager receives a value of 30.5 and the Source Units are set to feet, FuelsManager knows to treat this as 30.5 feet.

Engineering unit conversions can be associated with any database point via the Select Data Source window.

If the engineering units for the FuelsManager database point do not match those defined for the I/O point (Source Units), it will automatically be converted the engineering units defined for the FuelsManager database point.

If Source Units are not defined, FuelsManager assumes that the data received from the I/O point is in the same units as the FuelsManager database point and no unit conversion is performed.

The following example shows data received by FuelsManager, the same functionality applied to data transmitted by FuelsManager.



Configuring Bit Field Data Sources

The concept of Bitfields allows you to configure how individual bits within an integer value are manipulated. To enable bitfield processing you select the Bitfield Data option on the Input, Output or Triggered edit point dialogs; this option is only available for integer type data formats, including:

- Char
- Byte
- Short
- Word
- Long
- DWORD

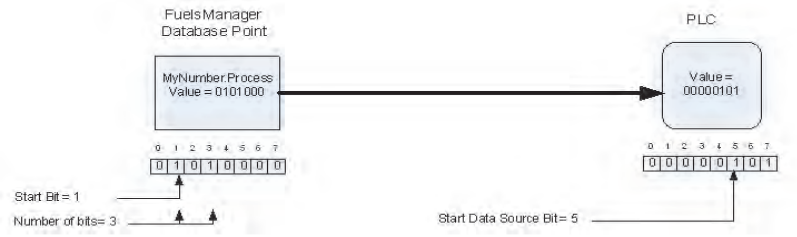
When the Bitfield Data option is enabled for a particular point the Start Bit, Number of Bits and Start Data Source Bit parameters on the Select Source dialog are enabled.

The Start Bit value defines the first bit position in the FuelsManager database point that should be processed.

The Number of Bits value defines how many bits in the FuelsManager database point should be processed, starting with the Start Bit.

The Start Data Source Bit value defines the first bit position in the I/O point that the start bit (and subsequent number of bits) should be written to.

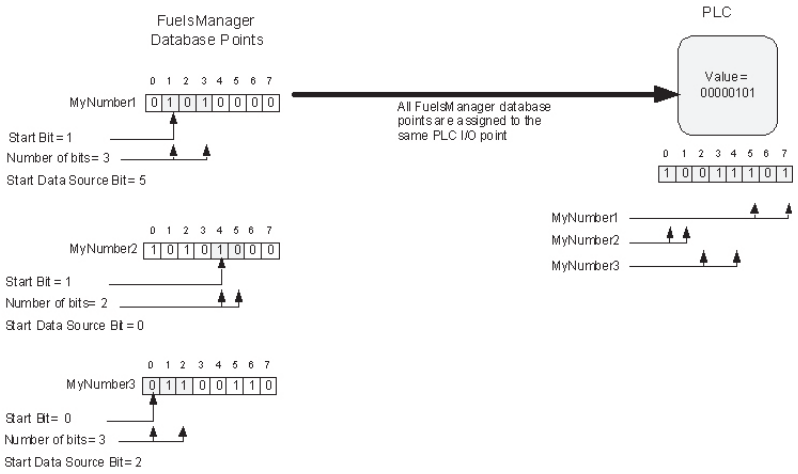
The following example shows data transmitted by FuelsManager, the same functionality applied to data received by FuelsManager.



Note In the above example only 3 bits in the FuelsManager database value are define. However, FuelsManager will write the entire word to the PLC. This means that any data stored in bit 0 through 4 in the PLC word will be overwritten by zeros when bits 5, 6 and 7 are written. It is the engineer's responsibility to ensure that writing bitfields does not cause unexpected operations in the PLC.

Points with the Bitfield Data option enabled allow up to 32 independent data source assignments. This allows the combination of multiple bits into a single integer or the writing of single bits, from multiple integers, into a single PLC register.

Again the following example shows data transmitted by FuelsManager, the same functionality applied to data received by FuelsManager.



Copying and Renaming Points

Database Points can be renamed or copied at any database level.

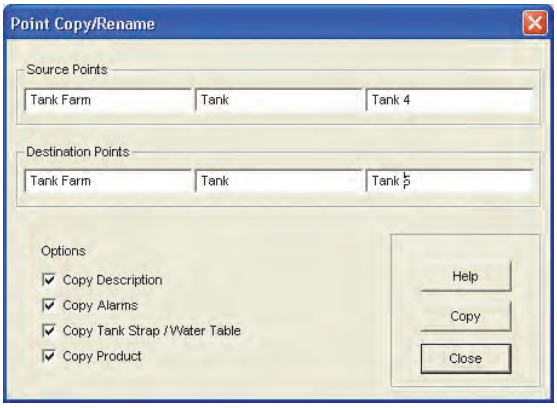


Figure 5-29: Point Copy/Rename dialog

1. From the Database Edit window, select the desired database point level.
2. Click Copy (or Rename). The Point Copy/Rename window appears, with appropriate options to copy or rename. (The items in the Options section are not available when Rename is selected.)
3. In this window, you enter the Source points used to copy or rename the Destination points. Each edit box corresponds to a database level. For example, if you were editing a two-level database point, the leftmost edit box would be unavailable.
4. Enter the Source Points.
5. You can rename points using a combination of methods by entering an asterisk (*) in the appropriate edit box(es). For example, you can type BARGE in the Level 2 edit and then enter asterisks (*) in the remaining edit boxes. This combination instructs the database to rename the Level 2 of the destination points, but to leave the remaining levels unchanged.
6. If the entire point needs to be renamed, you then enter the existing point in the Source Points edit boxes and the new name in the Destination Points edit boxes. In the above example, the Tank Farm.Tank.Tank 4 point is renamed Tank Farm.Tank.Tank 5. You could have also entered an asterisk in the Destination Point's third edit box instead of typing in GAUGE.
7. Enter the Destination Points. You can also use asterisks. These points will be renamed according to the defined Source points.
8. Click Copy (or Rename, if renaming). A message is displayed warning you that any Graphics or Reports that reference the point(s) that are about to be renamed may now be invalid.
9. If the point(s) are renamed successfully the Database Copy/Rename Status window will indicate a status of OK, otherwise it will indicate the reason why the rename failed. When renaming multiple points the Database Copy/Rename Status window will indicate which points were successfully renamed and which failed.
10. Click OK. Changes or new points appear in database.

Point Copy /Rename window	
SOURCE POINTS	These fields define the FuelsManager database point to be used as the source for the copy / rename action. Wildcard characters allow you to copy an entire database level at once.
DESTINATION POINTS	These fields define the FuelsManager database point to be created by the copy / rename action. Wildcard characters allow you to copy an entire database level at once.

Point Copy /Rename window	
COPY DESCRIPTION	Copy the description of the source point to the destination point.
COPY ALARMS	Copy the alarms associated with the source point to the destination point.
COPY TANK STRAP TABLE	Copy the tank strapping table of the source point to the destination point.
COPY PRODUCT	Copy the product assigned to the source point to the destination point.

6 Archiving Information

ArchiveManager

ArchiveManager is a FuelsManager subsystem that extracts information from FMDataManager and stores it to an alternate data source, which is usually a third party ODBC compliant relational database.

This section describes how to configure ArchiveManager to archive points and associated variables to a relational database management system (RDMS) with an ODBC interface (MS SQL, Access, etc.). This chapter also explains how to start and shutdown ArchiveManager.

ArchiveManager Prerequisite

You must setup a user in FMConfiguration to enable ArchiveManager to access data. The user must be named *System* and must be assigned to the Administrator group. See “Users and Groups” on page 16 for details on setting up this user.

Opening ArchiveManager

You can access the ArchiveManager Configuration window from the Database menu in the FuelsManager Configuration application.

1. In the Configuration window, click Database.
2. Click ArchiveManager. The Archive Manager Configuration window appears and is shown below.

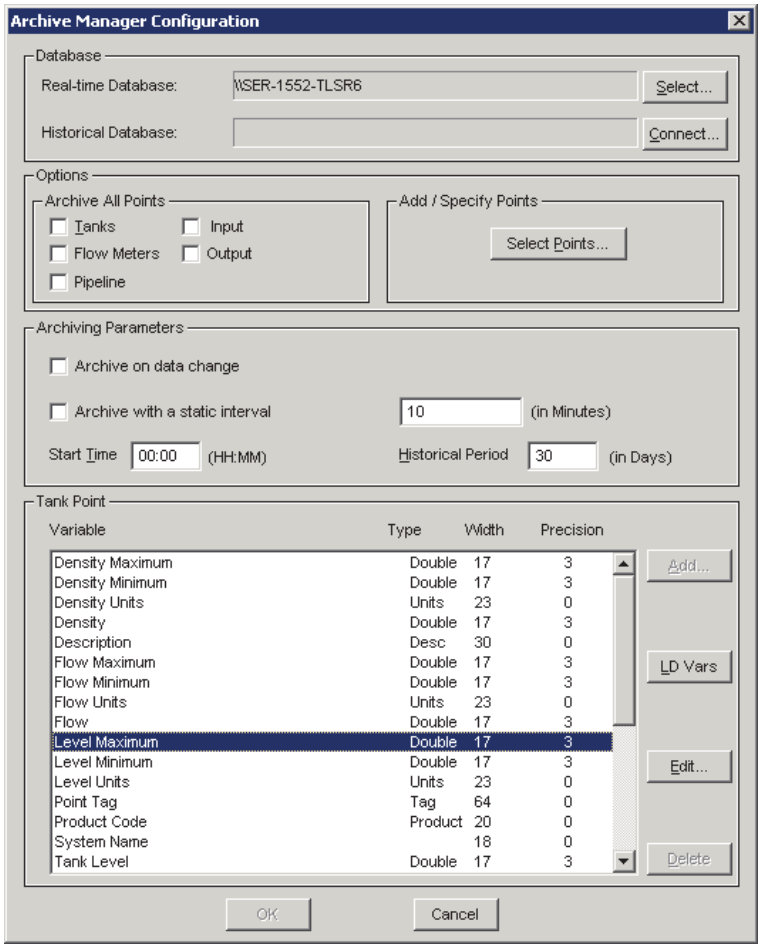


Figure 6-1: ArchiveManager Configuration window

ArchiveManager Configuration

Before ArchiveManager can begin transferring data, you must first configure the system to archive the correct data, in the correct format, on your planned schedule.This includes:

- Select a real-time Database(s)--the DataManager from which ArchiveManager extracts data.
- Connect to a data source (ODBC-compliant RDBMS).
- Enter the Options to archive all points or select specific points.
- Set the Archiving Parameters for when a point is archived.
- Selecting FMDataManager variables to be stored.

When you finish configuring ArchiveManager, you must click OK and then restart the Archive Manager service to enable the new settings.

Select a real-time database

1. In the Archive Manager Configuration window, click Select. The Select FMDataManager Sub-system window appears.

2. Select the database systems you want ArchiveManager to transfer from. To select more than one, press <Ctrl> and click on multiple DataManagers. Or click Select All to select all options in the window.
3. Click OK after you make your selections. The system returns you to the Archive Manager Configuration window. Your database selection appears in the Real-time Database display field.

   Note You must have permission to access these database systems, or the data transfer fails.

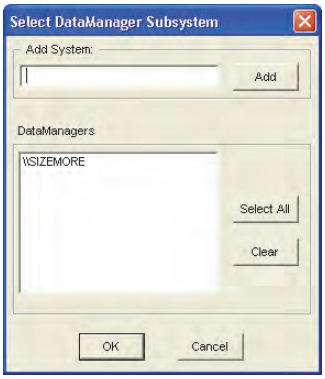


Figure 6-2: FMDataManager Subsystem window

Add or connect to an archival data source

Before ArchiveManager can begin transferring data, you must first connect to an archival data source. Without the archival data source, the system does not have a destination to store the data.

1. From the Archive Manager Configuration window, click Connect. The Select Data Source window appears.
2. Click the Machine Data Source tab.

   The default FuelsManager installation creates a machine Data Source called FMSystem Access--This is Preconfigured to point to the ODBC data source selected during installation; a Microsoft SQL or Access database.

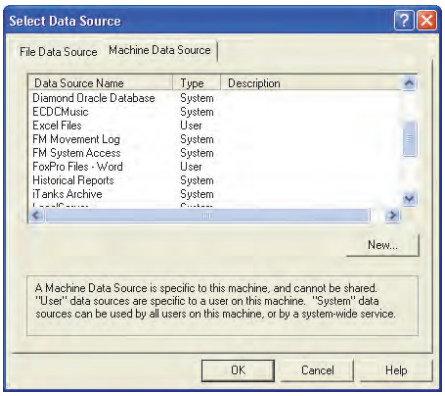


Figure 6-3: Select Data Source window

3. Select a Data Source from the list of existing options or click New to add a new data source to the list.
4. Enter the login information. The information entered depends on the ODBC data source selected. There may be additional configuration windows to be completed. For further information, refer to Windows ODBC Help.
5. Click OK. You return to the Archive Manager Configuration window showing the Data Source you selected in the Historical Database display field. The system also changes the Connect button to Disconnect.

Disconnecting from an archival data source

To disconnect ArchiveManager from an archival data source, click Disconnect. The system disconnects from the archival data source and clears the Historical Database display field.

Setting Options

The Options area, shown below, allows you to set Archive Manager to archive all points or select specific points for archive.

Figure 6-4: Archive Manager Options Area

Archiving All Points

1. In the Archive All Points, select the points you want to archive for the equipment or flow, the options are:
   - Tanks
   - Flow Meters
   - Pipeline
   - Input
   - Output
2. Select or clear the appropriate check box for the points you want archived.

Adding Specific Points

You can select specific points to archive, as follows:

1. In the Add/Specify Points area, click the Select Points button and the Add/Specify Points window opens as shown below.

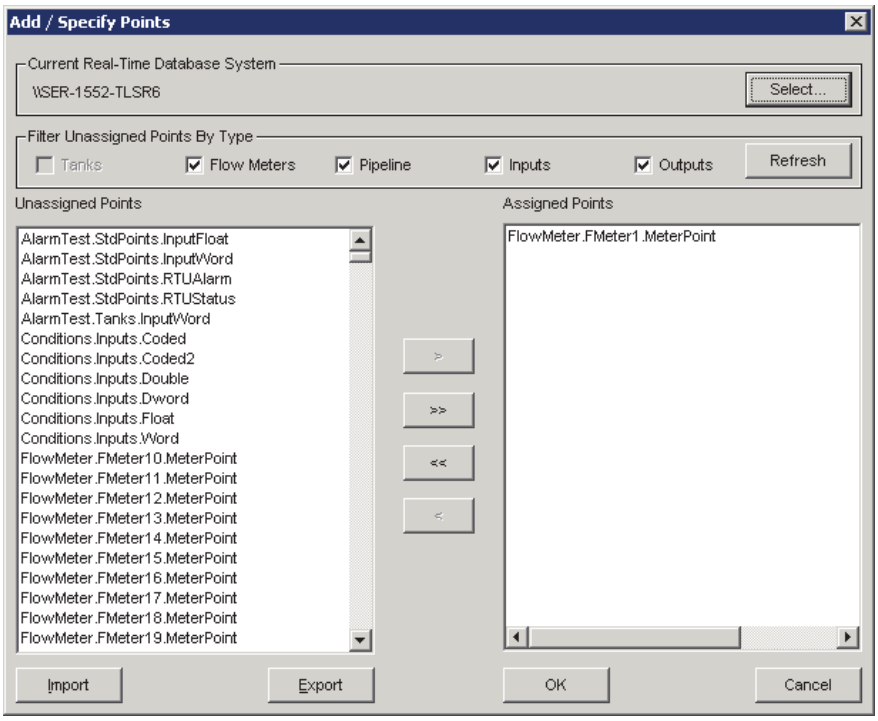


Figure 6-5: Add/Specify Points Window

2. Select the points by using the check boxes in the Filter Unassigned Points By Type area.

   Note If you have selected to Archive All Points for a type (Tanks in the above example), the Tanks check box is unavailable in this window.

3. Select the Unassigned Points in the left pane and use the right arrow button to move them to the Assigned Points pane. The double right arrow button moves all Unassigned Points to the Assigned Points pane.

   If you want to unassign a Point, select the point and use the left arrow to move it to the Unassigned Points pane. The double left arrow button move all Assigned Points to the Unassigned Points pane.

4. Click OK to save the points you have set.

Archiving Parameters

The Archiving Parameters allow you to set when the archive is written by the Archive Manager. You can set the points to archive on data change or to archive on a given schedule.

Note You must select either 'Archive on data change' or 'Archive with a static interval.' If this Archiving Parameter is not set, a System Fail error is generated when attempting to start ArchiveManager.

Setting Archive on Data Change

To archive the points when the data changes, select the check box 'Archive on data change'.

Setting the ArchiveManager Schedule

The ArchiveManager writes data on a schedule, based on your entries in the Start Time and Interval fields in the ArchiveManager Configuration window, as follows.

1. Select the 'Archive with a static interval' check box to enable this feature.
2. In the Start Time field, enter the time (in HH:MM format) that you want to begin archiving data.
3. In the Interval field, enter the number of minutes you want to leave between data transfers. The minimum interval is 5 minutes.
4. In the Historical Period field, enter the numbers of days you want from 1 through 9999 days. This is the time period for the archive in days. Any record older than this time period will be overwritten by newer data.
5. On startup, ArchiveManager takes the start time, the interval, and the current time, compares these values and determines when the archive should be updated.

In the following example ArchiveManager, writes the first archive at 08:15 and then every ten minutes there after.

Start Time – 08:15 / Interval – 10 minutes / Current Time – 10:08

> Note You can set the Archive Manager to both 'Archive on data change' and 'Archive with a static interval.' When both archive options are set, anytime the point data changes, the data archives, even if the static interval start time has not been reached.

ArchiveManager – EOM Backup

The EOM Backup option is only available if the selected archival data source is a Microsoft SQL Server based database. If another data source is selected the option will be disabled.

If selected the EOM backup option backs up the entire contents of the archive description tables and the last month of data from the archive data tables. The data is backed up to files located in the SQL Server backup directory (typically – C:\Program Files\Microsoft SQL Server\MSSQL\BACKUP).

This option will create two files named as follows: <tablename>.<date>.dat

Point Variables

ArchiveManager lists the current point variables in the Tank Point Variables list in the ArchiveManager Configuration window. You can add, edit, and delete the point variables with the Add, Edit, and Delete buttons.

Adding point variables to ArchiveManager

1. From the Archive Manager Configuration window, click Add. The Select Point Variable window appears.
2. Click on the point variable you want to add. The selection is highlighted.
3. Click OK. The system adds the variable you selected and returns to the Archive Manager Configuration window.

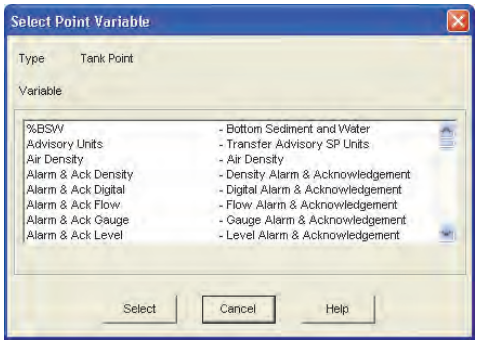


Figure 6-6: Select Point Variable window

Editing point variables

Note When adding numeric variables to Archive Manager, you should also add the variables min/max units and engineering units. Failure to do so prevents FuelsManager from displaying historical trend plots for the variable and will make the data archived less useful to external systems.

1. Click on the point variable you want to change. The selection is highlighted.
2. Click Edit. The Edit Variable window appears.
3. Click Variables. The Select Point Variable window appears.
4. Select a point variable and click Select. The system returns you to the Edit Variables window, showing the Point you selected.
5. Change the width and precision of the variable by entering them in the current entries.
6. When you finish modifying the variable, click OK. The system saves your changes and returns you to the Archive Manager Configuration window.

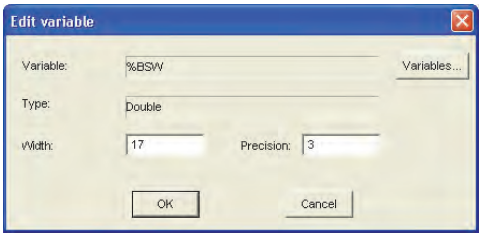


Figure 6-7: Edit Variable window

Deleting point variables

1. In the Tank Point Variables display window in the Archive Manager Configuration window, click on the variable entry you want to delete. The selection is highlighted.
2. Click Delete. The system deletes the entry from the Tank Point Variables window.

After a variable has been added to the ArchiveManager configuration and you have confirmed the addition by clicking OK on the ArchiveManager Configuration window, it cannot be deleted.

Records

ArchiveManager creates two records for each type of point selected, one for data, and the other for the description. Data Records are updated at the selected interval and are subject to the Historical Period field and contain process data. Description Records are only updated on change and are not subject to the Historical Period field and contain configuration information. Refer to the following tables for a complete list.

Tank Point Records

Data Record	Description Records
Point Tag	Point Tag
Product Code	Description
System Name	System Name
Tank Level	Level Units
Tank Level Status	Temperature Units
Temperature	Flow Units
Temperature Status	Density Units
Density	Volume Units
Density Status	Minimum Level Range
Gross Volume	Maximum Level Range
Gross Volume Status	Minimum Temperature Range
Net Volume	Maximum Temperature Range
Net Volume Status	Minimum Density Range
Remaining Volume Net	Maximum Density Range
Remaining Volume Net Status	Minimum Volume Range
Available Volume Net	Maximum Volume Range
Available Volume Net Status	Minimum Flow Range
Flow	Maximum Flow Range
Flow Status	Time Zone
Water Level	Time Stamp
Water Level Status	
Tank Status	
Tank Status Status	
Data Time Stamp	
Description file Time Stamp	

Input Point Records

Data Record	Description Record
Point Tag	Point Tag
Description	Description
System Name	System Name
Alarm Status	Units

Data Record	Description Record
Process Value	Minimum Process Value Range
Process Value Status	Maximum Process Value Range
Ticks	Type
Point Time	Time Stamp
Units	
Time Stamps	
Description Time Stamp	

Output Point Records

Data Record	Description Record
Point Tag	Point Tag
Description	Description
System Name	System Name
Alarm Status	Units
Output	Minimum Process Value Range
Output Status	Maximum Process Value Range
Process Value	Type
Process Value Status	Time Stamp
Ticks	
Point Time	
Units	
Time Stamp	
Description Time Stamp	

7 Configuring Communications

Communications interface configuration

The Server architecture module CommManager is responsible for exchanging data between the FMDataManager module and external field devices, such as tank gauges and remote terminal units.

> Note Make sure that the CommManager is not in Shutdown mode. Otherwise, you can not access the configuration and maintenance windows.

To access the Communications menu, you must have appropriate privileges (refer to the Security). In most configurations, operators do not have access to communication interface configuration.

The communications interfaces and associated devices of the CommManager are configured and maintained from the Communications menu found in the Configuration application.

Configuration can include creating an interface, selecting a port, creating a device, and establishing connections from the database points to the designated field devices. The procedures for creating interfaces and devices vary depending on the type of device you are using.

An interface is utilized to transfer data into or out of a system. An interface is like a communication channel, such as a serial port or network card. Some examples include the Varec 8130 RTU, Modbus Master, Modbus Slave, and Varec TSU.

Communications Interface Configuration window	
INTERFACE DESCRIPTION	Displays the interface description entered when the interface was created
INTERFACE TYPE	Displays the interface type (Varec 8130 RTU, Modbus Master, Modbus Slave, and Varec TSU)
PORT	Displays the selected hardware port used by the interface. It may be a serial port or another hardware communications channel
LOCKED	Indicates if the interface is available for configuration

Creating a new interface

The types of interfaces that can be created are dependent on the drivers installed on the system. After drivers have been installed, a new interface can be created.

1. From the Configuration application, Communications menu, select the Configuration command.
2. From the Communication Interface Configuration window, select New. The Choose The Type of Device window appears.
3. Select the type of device you want to create. Only devices with the drivers already installed will appear for selection.
4. Click OK.
5. The Port Type window appears.
6. Select the port type that the device is connected to, Local Serial Port, LAT Terminal Server Port or Dial Up Modem.
7. The port type selected will determine what window will appear next and the available settings.

8. Edit the port configuration necessary for the device you are creating.
9. Select OK after the device has been configured.
10. The Communication Interface Configuration screen will appear with the recently created configuration listed.

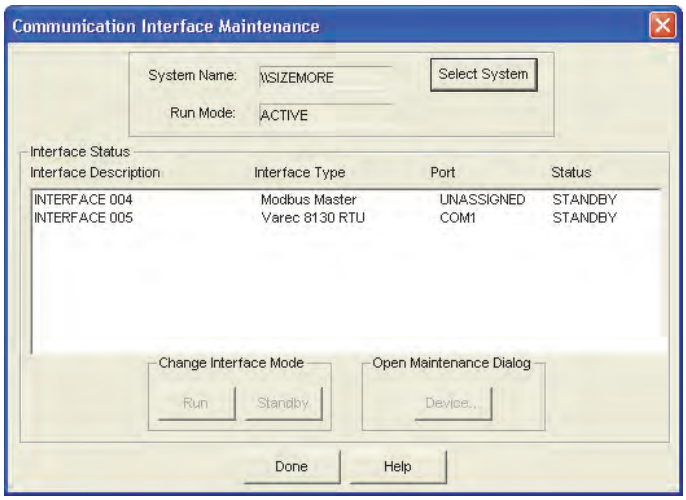
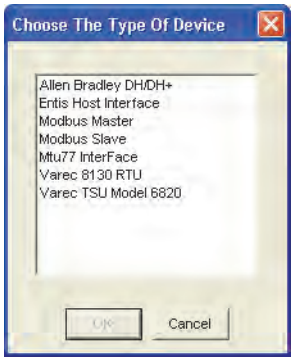


Figure 7-1: Communication Interface Configuration window



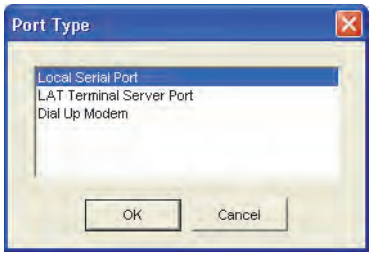


Figure 7-2: Left - Choose the type of device

Figure 7-3: Right - Select the port type

Local serial port and Dial-up modem

The local serial port is used when using any of the serial communications from the local system. The dial up modem is used when using a modem for communication.

The configuration of the local serial port and dial up modem involves the definitions of the baud rate, data bits, stop bits, parity bit, handshaking, and the port identification.

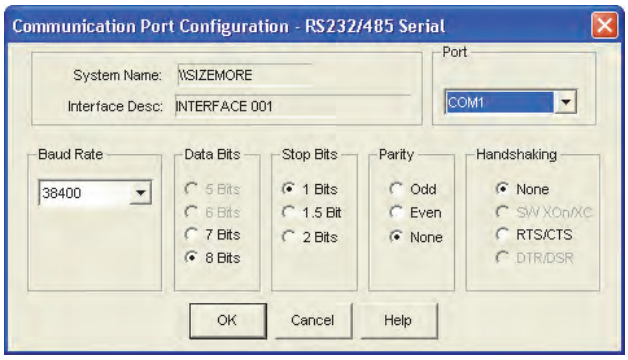


Figure 7-4: Communication Port Configuration window

LAT Terminal Server Port

Local Area Transfer (LAT) systems support is for legacy systems running on NT systems only with the 900DSL communication server and the 8130 RTU.

Communications port configuration

The communications port configuration is specific to the type of hardware the system utilizes to communicate with field devices. In the case of a serial port interface, parameters such as baud rate and number of data bits are available for configuration. An interface must have a valid configuration for a hardware port before communications with a field device can occur.

The window used to configure a port is first displayed during initial configuration. The port can be edited by selecting the Port button inside the Device Configuration window.

The port list box displays the selected communication ports from the list of available ports not assigned to other interfaces. There will always be an UNASSIGNED entry in the list. The UNASSIGNED selection disables all other controls in the window until a valid port is chosen.

An interface may be configured with its hardware port UNASSIGNED, but the interface may not be activated until a port is chosen. If the device is currently ACTIVE it will be set to STANDBY. Once a valid port is chosen other communications parameters may be set. Choices will be restricted to those which are supported by the device.

Locked interfaces and devices

A Lock status is set when a user is configuring an interface or device.

If another user is configuring the same interface from another FuelsManager system, configuration access to this interface will not be allowed. A message will be displayed noting which user has the interface locked and from which system this user is working. If the interface is unlocked, configuration can proceed normally.

When a user clicks Done at the end of a configuration process, the action saves the configuration, updates the run-time interface and resets the configuration lock of the interface. When an interface is locked during configuration, the run-time operation of that interface is not interrupted and continues until the user configuring the interface clicks Done.

> Note The time period should be insignificant enough that the user does not notice any interruption of data to or from the interface.

At that time, the run-time operation of the interface is interrupted just long enough to modify its configuration, and then normal operations resume. This time period varies from one device to the next.

Device configuration

Device configuration varies widely between different types of devices. Consult the device user's documentation for further instruction.

If an interface has a valid port configuration as well as a valid device configuration, the interface can be placed in an active mode so that communication with the field device can occur. If the device was not configured when the interface was created, the device can be subsequently configured through the Communications Configuration window.

1. Select Devices in the Communications Interface Configuration window.
2. The device specific configuration dialog appears.
3. Enter configuration parameters for the particular device. There may be multiple windowes that need to be completed for the configuration.
4. Click OK in the Device Configuration window after all configurations have been made for the device.
5. Click OK in the interface type configuration window once all devices have been defined.

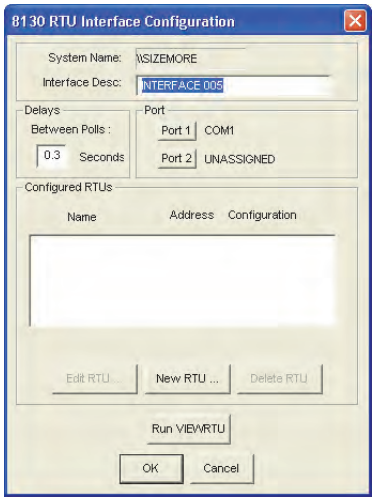


Figure 7-5: RTU8130 Interface Configuration window

I/O Point connections

I/O point connections designate the link between the DataManager database point and the field device. Each device has its own set of predefined CommManager I/O points depending on that device type. For data to pass between the CommManager and the FMDataManager, the CommManager I/O points must be connected to FMDataManager point variables. One or more databases can be interconnected with the CommManager over a network.

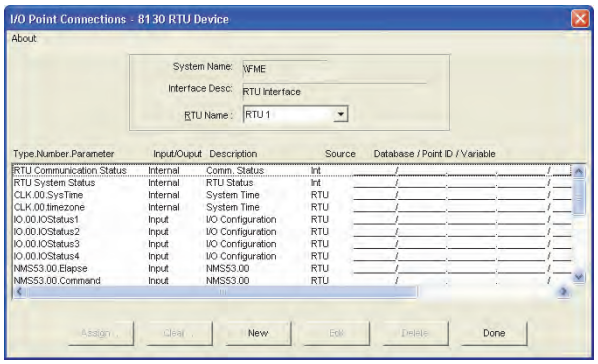


Figure 7-6: I/O Point Connections window

Restrictions to I/O points

Some devices do not allow the connection of I/O points to DataManager point variables of an incompatible type. As a result, restrictions may apply when selecting a database point depending on the engineering units and data format (for example, Float, DWORD, etc.)

Types of I/O points

Device drivers can support three types of I/O points:

Internal	An internal point only exists in the device driver software, and typically provides information about the status of the communications between FuelsManager and the device
Input	Input points collect data from the field device and can be connected to FuelsManager point variables in order to read data from the field
Output	Output points read data from FuelsManager point variables and can be connected to I/O points to write values to field devices

Maintenance

You can perform maintenance and diagnostics on the interfaces and corresponding devices. In the Communication Interface Maintenance window, you can change an interface's mode as well as open the device windows of that interface to display diagnostic information.

1. Select Communications in the Configuration window.
2. Select Maintenance.

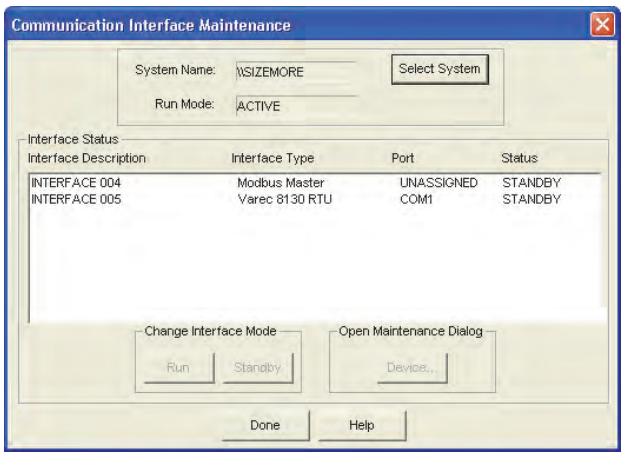


Figure 7-7: Communication Interface Maintenance window

Change interface mode

Each individual interface has a current status, which is either STANDBY or ACTIVE.

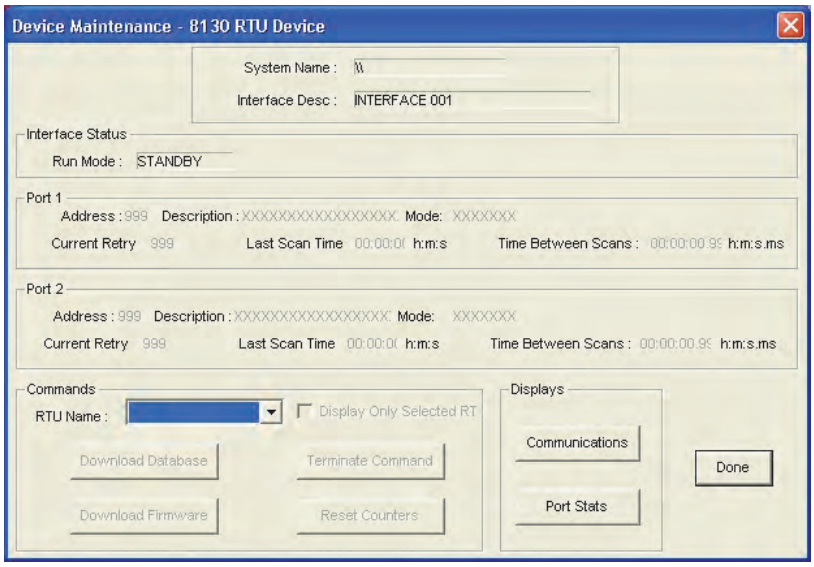
The CommManager does not communicate to the field devices when an interface is in STANDBY. The port is then available to other non-FuelsManager programs.

When an interface is ACTIVE, the communications port becomes active and unavailable. Communications then become operational. The data is transferred to and from the database as defined by the device I/O point configurations.

1. Select the Interface description in the window for the interface to modify.
2. Select Run button to change the device from STANDBY to ACTIVE.
3. Select Standby button to change the device from ACTIVE to STANDBY.
4. Click Done to finish.

Device maintenance

Device maintenance is accessible by selecting the Device button in the Communications Interface Maintenance window. It allows you to view diagnostic information about the selected device. Diagnostic capabilities vary from device to device.


Device Maintenance - 8130 RTU Device
System Name : \\
Interface Desc : INTERFACE 001
Interface Status
Run Mode : STANDBY
Port 1
Address : 999 Description : XXXXXXXXXXXXXXXX Mode: XXXXXXX
Current Retry 999 Last Scan Time 00:00:0(h:m:s Time Between Scans : 00:00:00.9(h:m:s.ms
Port 2
Address : 999 Description : XXXXXXXXXXXXXXXX Mode: XXXXXXX
Current Retry 999 Last Scan Time 00:00:0(h:m:s Time Between Scans : 00:00:00.9(h:m:s.ms
Commands
RTU Name :
Display Only Selected RT
Download Database
Terminate Command
Download Firmware
Reset Counters
Displays
Communications
Port Stats
Done

8 Configuring Product Movement

The Movement System lets you setup and monitor Product Movements and produces archive information on the Movement. A Movement involves transferring product from one or more Sources to one or more Destinations.

> Note Product Movement is an optional feature that is only available with FuelsManager Professional Edition. The Standard Edition will not allow access to this feature. For additional information about upgrading to the Professional Edition and above, please contact your Varec representative.

The FuelsManager Product Movement system is divided into two parts, the definition of possible movement paths (creating a movement) and the operation of the actual product movement (operating a movement instance).

The creation of possible movement paths is performed from the Configuration program and documented in this section, while the operation of movement instances is performed from the Operate program and documented in the User Guide for the Operate program

Movement types

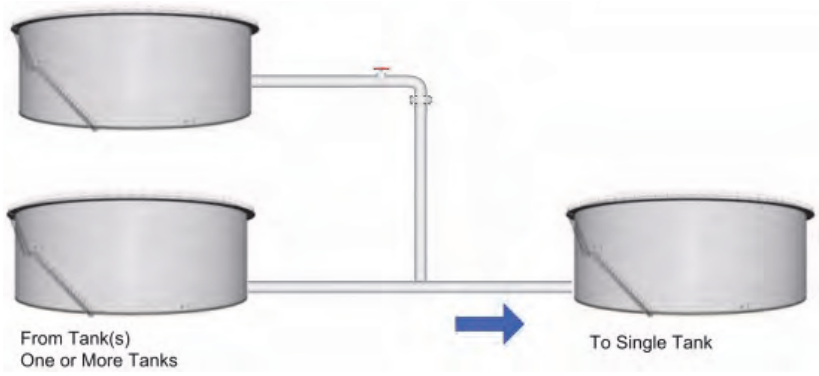
The following table shows the different types of Movements:

Movement Types	From (Sources)	To (Destinations)
Blend	One or More Tanks	One Tank
Charge	One Tank	One Unit
Receipt	One Unit	One or More Tanks
Run-Down	One Unit	One Tank
Shipment	One or More Tanks	One Unit
Transfer	One Tank	One Tank
Water Drain	One Tank	One Unit

To assist in setting up complex movements, movements can be chained together to produce combined movements

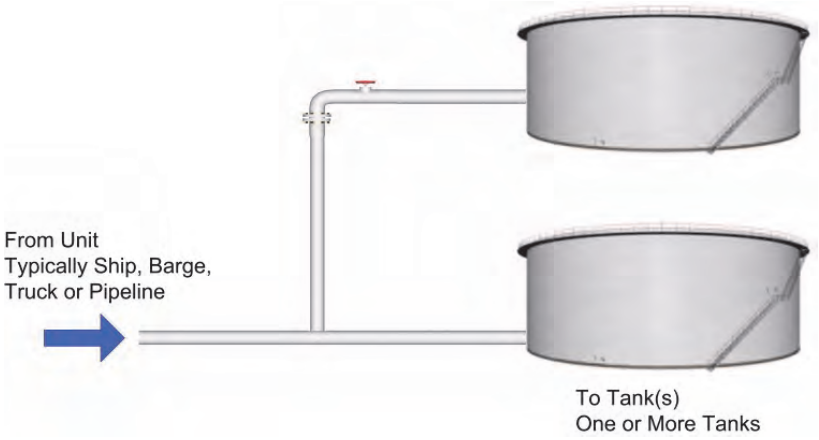
The following are illustrations of the Movement Types.

Blend



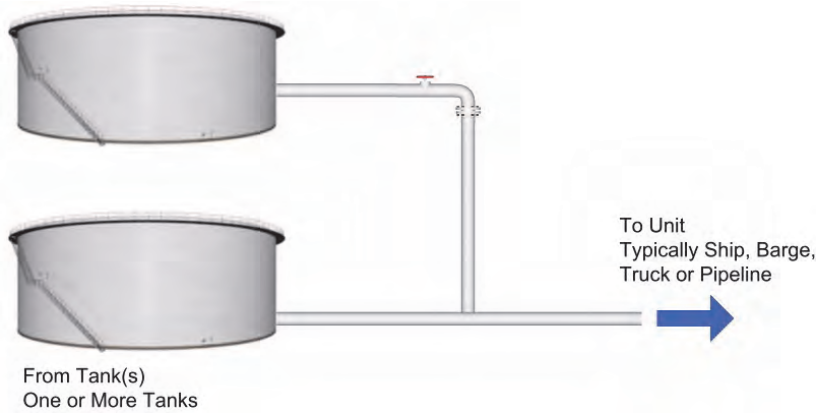
Charge

Receipt

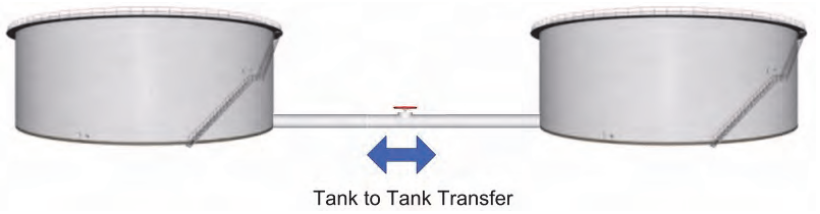


Run-down

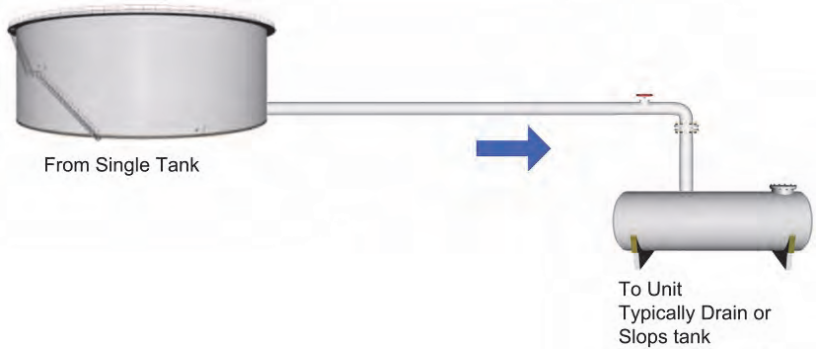
Shipment



Transfer



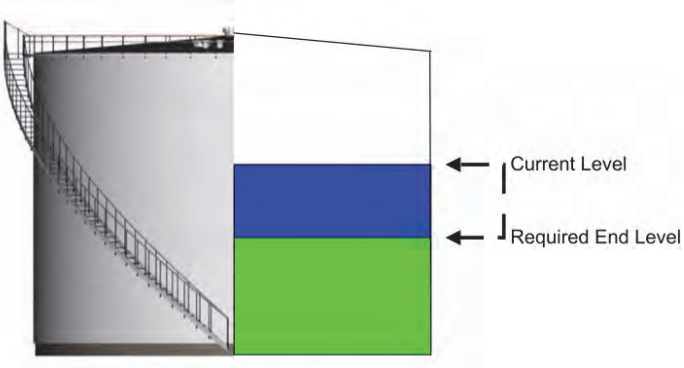
Water-drain



Xfr modes

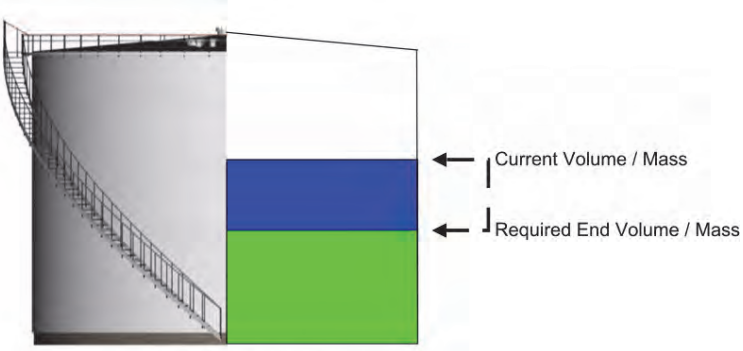
The transfer (or Xfr) mode refers to the measuring denomination you are using to measure the product movement: Level, Mass, or Differential Volume or Mass. These examples illustrate the different types of xfr modes.

Transfer by Level



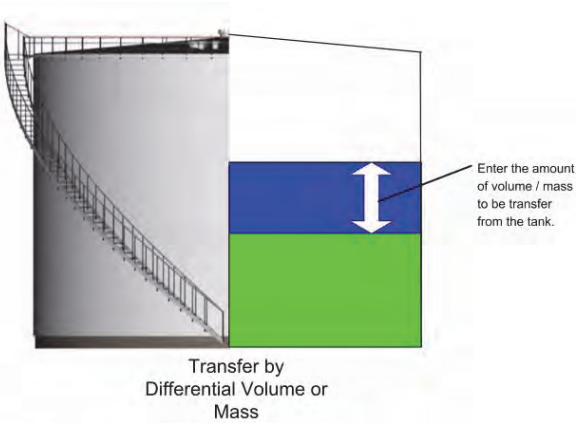
Transfer by Level

Transfer by Volume or Mass



Transfer by Volume or Mass

Transfer by Differential Volume or Mass



Transfer by Differential Volume or Mass

Definitions

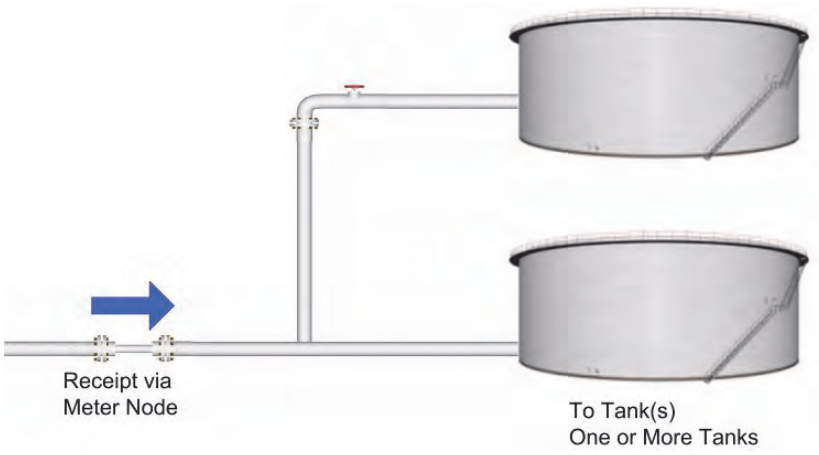
This guide uses the following terms when explaining how to configure the Movement System.

Movement summary

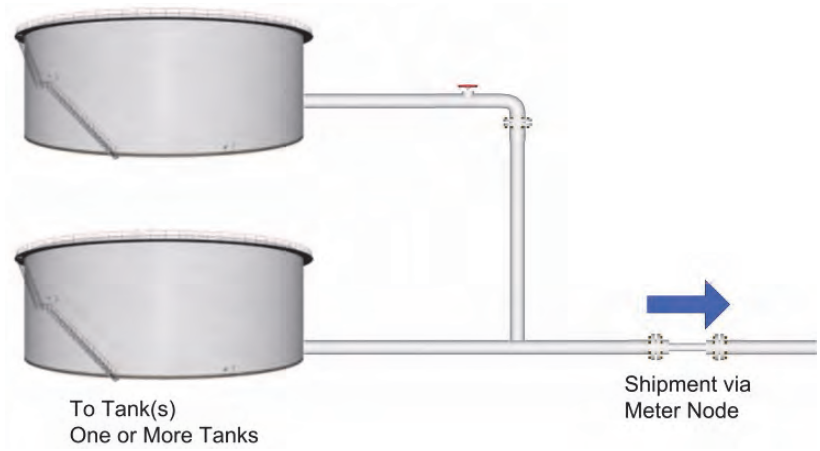
Unit – The movement system allows the creation of Source/Destination designations called units, examples could be Pipeline XYZ, Truck Rack 123, Pumphouse A2B. Units allow the operator to use meaningful names for plant items being utilized for product movements. A unit has no measuring device so it has no way of monitoring product movement, users cannot enter movement setpoints for a unit and movements involving units will not calculate discrepancies.

Meter Node – A location in a product movement instance where a reading from a physical meter is possible. You can associate FuelsManager input and output database points with meter nodes and have the meter data automatically collected or manually entered.

Receipt



Shipment



Term	
Closeout	is defined as one of the following: Closeout – Stopping of the movement (either manually OR due to non-zero flow) If the movement is active at the system specified closeout time (default midnight)
Opening Value	is defined as one of the following: If a close out has occurred, the opening value is the value of the particular variable at the last closeout time. If the movement has been started but a closeout has not occurred yet, the opening value is the value of the particular variable when the movement started.
Closeout Value	only exists after a closeout event has occurred. If the movement remains active, and further closeout events occur the closeout value will be updated.
Start Value	is the value of the particular variable when the movement was initiated.
The following are possible movement states along with their meanings:	
Inactive	the movement has been setup but has not been initiated by the operator.
Active	the movement has been initiated by the operator and is not configured to use Start on Non-Zero Flow.
Disabled	the movement cannot be initiated because one or more of the tanks involved in the movement are currently in use by another movement and this movement cannot be combined.
Halted	the movement has been paused by the operator.
Failed	during the start-up of the movement a failure occurred, the movement is neither active nor inactive. The operator must use the Reset menu option to clear this state.
Starting	The movement has been initiated by the operator but the movement has been configured to Start on Non-Zero Flow and no flow has been detected yet.
Stopping	The movement has been configured to Stop on Non-Zero Flow and zero flow has not existed for a time greater than the Zero Flow Hold Off Value.
Combined Movement	is a combination of movements that involve one or more common tanks, the following combinations are NOT allowed:

A combination that involves the same node pair twice.

Transfer	Tank 1	Tank 2
Blend	Tank 1	Tank 3
		Tank 2

Charge	Tank 1	Unit XYZ
Shipment	Tank 2	Unit XYZ
	Tank 1	

A combination that results in a circular transfer of product.

Transfer	Tank 1	Tank 2
Transfer	Tank 2	Tank 3
Transfer	Tank 3	Tank 1

Discrepancy	is the difference between the total amount transferred from all the From tanks and the total amount received at all the To tanks.
Totals	is only available for Shipment and Receipt movements and is the sum of amount transferred.

Movement history

The movement history allows the operator to view all product movements, totals, and discrepancies on a daily basis. Operators can open multiple movement history windows and visually compare movement data from different days.

The movement history is a Microsoft Access MS SQL database and may be accessed offline in order to create custom reports using 3rd party reporting tools.

The movement system writes records to the movement history at the following times:

- If a movement is stopped, either manually by the operator or automatically on non-zero flow (if the Stop on Non-Zero Flow option is selected).
- If a movement is active at the system close out time. The default close out time is midnight but can be configured to be any single time during the day.

Defining Movement Paths

In FuelsManager, setting up movement paths involves the following procedures:

- Defining Nodes
- Defining Sources and Destinations
- Defining Groups (Optional)

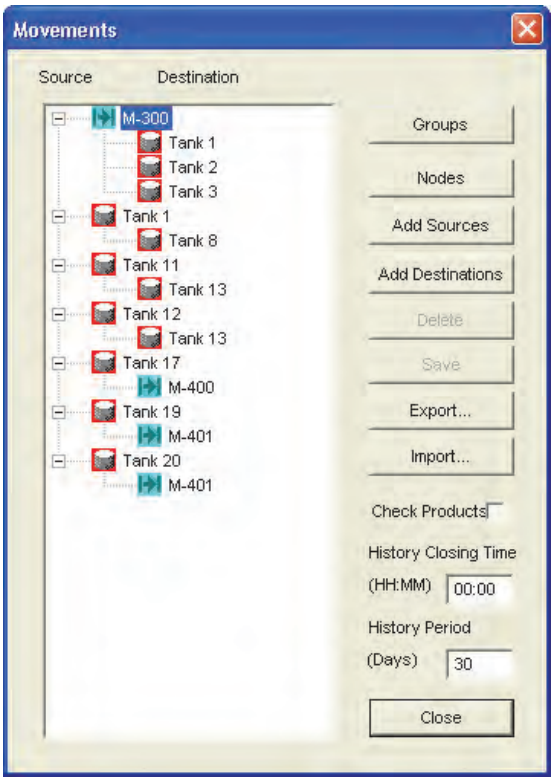
Before you start

Before you start configuring Movements, make sure that the database is not in SHUTDOWN mode. Otherwise, you will not be able to access the configuration dialogs.

The database mode can be altered from the System Menu of the Configuration program. Select System and click Startup Options. The dialog containing the startup modes is displayed.

Accessing the movement configuration

1. Open the FuelsManager configuration program.
2. Select Movement from the menu bar.



The window above lists all the Sources and associated Destinations found in the system. Each Source and corresponding Destination constitutes a valid movement path. You can add and save Sources and Destinations from a series of configuration dialogs. Selected Sources and Destinations can also be deleted.

The configurations defined by this dialog control the movement line-ups available for selection by the operator from the FuelsManager Operator interface.

If the Check Products check box is selected the system checks for product mismatch.

The History Closing Time field lets you enter a time of day that the system logs in the Movement data to the movement database. Two scenarios that may arise are:

- Scenario 1 consists of a movement that is still activate. The system writes the amount transferred for that day into the Movement History database and tags the movement as Active.
- Scenario 2 consists of a movement that is completed in this time frame. The system writes the total amount transferred during the entire movement to the Movement History database.

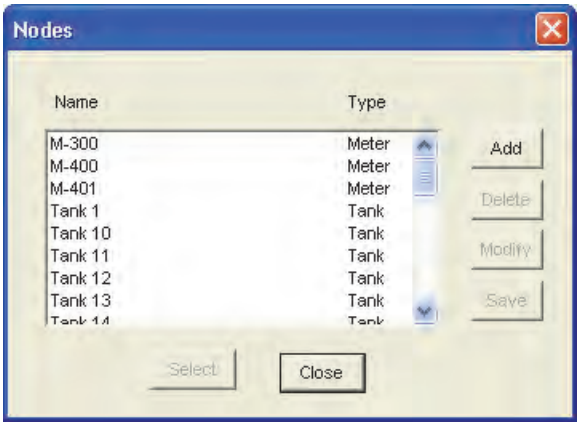
The Historical Period field allows you to enter the numbers of days worth of data you want to be maintained in the movement history (1 through 999 days). The system overwrites data that has exceeded this History Period with new data.

Defining nodes

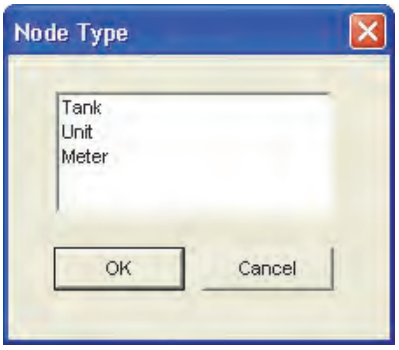
All available Source and Destination elements are called nodes. You can add nodes anytime during the configuration process. There are three types of nodes: Tanks, Units, and Meters. Tank nodes represent the facility's tanks, Unit nodes represent a vehicle or other temporary storage container, and Meter Nodes represent a flow meter through which the product is being moved.

Adding a Tank Node

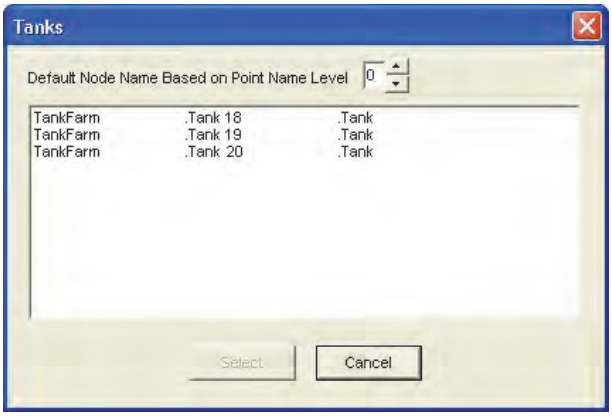
1. From the Movements window, click Nodes. The Nodes window appears and is shown below. This window lists all the nodes available for selection. The defined nodes are listed by name and type. From this window you can add, delete, or modify nodes in the movement system.



2. Click Add. The Node Type window appears and is shown below.



3. Select Tank and click OK. The Tanks window appears and is shown below. This window includes all database points that have not already been selected as nodes.



Note Each node name must be unique for the selected default node name based on the point name level. In the example given, all level 0 points are named 'Tankpoint' – this would NOT result in a unique node name, a better tank point name level selection would be Level 1.

4. Select the database level on which the node name will be based from the Default Node Name Based on Point Name Level selection.
5. Select one or more database points and click Select. Use the <Ctrl> or <Shift> key to select multiple nodes. The system returns you to the Nodes window.
6. Click Save. The system saves the nodes you added.
7. Click Close. The system returns you to the Movement window.

Adding a Unit Node

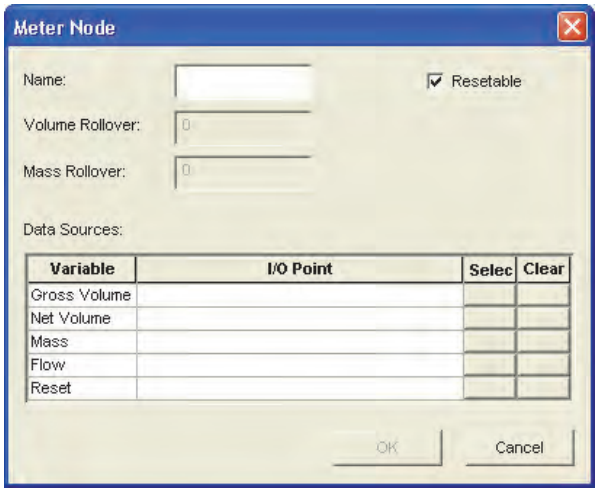
Note Each Node name must be unique.

1. From the Movements window, click Nodes. The Nodes window appears. This dialog lists all the nodes available for selection. The defined nodes are listed by name and type. From this window you can add, delete, or modify nodes in the movement system.
2. Click Add. The Node Type window appears.
3. Select Unit, the Unit can be any Destination or Source node such as a pier, barge, or pipeline.
4. Click OK. The Node Name window appears and is shown below.

5. Type in the Unit Node name and click OK.
6. Click Save. The system saves the unit node to the Movement system.
7. Click Close. The system returns you to the Movements window.

Adding a Meter Node

1. From the Movements window, click Nodes. The Nodes window appears. This window lists all the nodes available for selection. The defined nodes are listed by name and type. From this window you can add, delete, or modify nodes in the movement system.
2. Click Add. The Node Type window appears,
3. Select Meter and click OK. The Meter Node window appears and is shown below.



Note The reset data source is typically connected to a FuelsManager output point, which is used to send a command to a PLC/RTU to cause the flow meter accumulator to be reset.

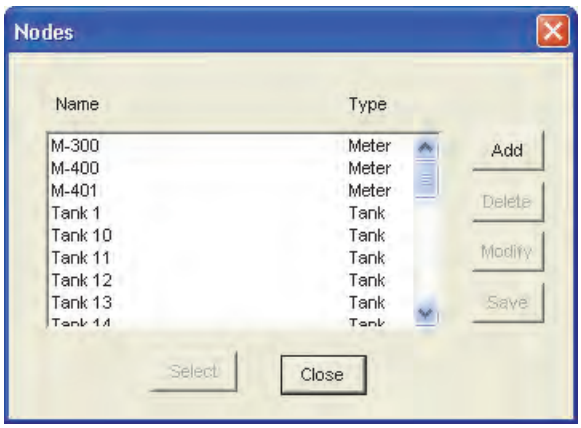
Note Meter nodes should be assigned to FuelsManager Input type points. Connections are only allowed to input points of data type double. In addition, the input point must be configured with engineering units that match the meter node variable being connected (Volume units for Gross/Net Volume).

4. Type the Name of the meter node.
5. Make the necessary settings for the meter node. Clear the Resetable checkbox if you do not want the meter to be resetable.
6. Define what the maximum volume and mass the meter is capable of counting to before rolling over to zero. Type these amounts in the Volume Rollover and Mass Rollover fields. These parameters are only available if the meter node is not resetable.
7. In the Data Sources grid, assign the meter node to its FuelsManager database points by clicking the corresponding button in the Select column.
8. To clear meter node database point assignments, click the button in the clear column, adjacent to the assignment you want to clear.
9. Use standard point selection processes to select database points.
10. After assigning the points, Click OK on the Meter Nodes window.
11. Click Save on the Nodes window. The system saves the meter node to the movement system.
12. Click Close. The system returns you to the Movements window.

Defining Sources and Destinations

To configure the Movement System, you need to specify which nodes you are using as movement sources and you must add destinations to the sources. A source can contain multiple destinations.

1. From the Movements window, click Add Sources. The Nodes window appears. This window lists all nodes that you have not assigned as a source and lets you select one or more of those nodes.
2. Select one or more nodes and click Select. Use the <Ctrl> or <Shift> key to select multiple nodes. Click Select.
3. Select the Source from the list box.



4. Click Add Destinations. The Nodes window appears and is shown above. This window lists all nodes except the selected source and lets you select one or more nodes.

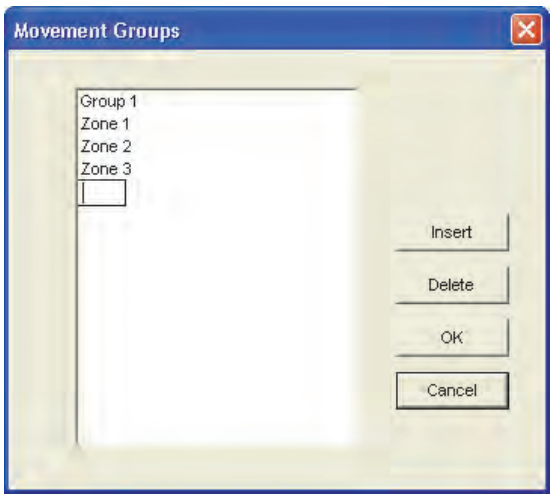
5. Select one or more nodes. Use the <Ctrl> or <Shift> key to select multiple nodes.
6. Click Select. You are returned to the Movements window. The contents are arranged in a tree-like format. View the Destinations of a Source by double-clicking on the desired Source.
7. Click Save. The system saves the defined Sources with Destinations.

Defining groups

Groups may be used to correlate multiple Movements. You can add groups anytime during the configuration process. Clicking the Groups button allows you to view all previously defined Groups or create new ones.

Inserting a group

1. From the Movements window, click Groups. The Movement Groups window appears as shown below.



2. Click Insert. Type in the new Group name.
3. Click OK. The system returns you to the Movement window.

   Note Each Group name must be unique.

Deleting a Group

To delete a group from the movement system, perform the following steps:

1. From the Movements window, click Groups. The Movement Groups window appears. This window lists all the groups.
2. Select the group to be deleted.
3. Click Delete. The selected group is erased from the list.
4. Click OK to save changes. The system returns you to the Movement window.

Editing Movement Paths

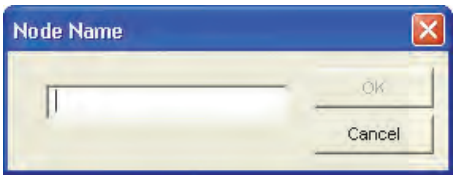
This section describes how to edit defined Movements. Sources and Destinations can only be added or deleted. Nodes, the basic component of Sources and Destinations, can be deleted or modified.

Modifying Nodes

This feature is used mostly when users want to enter a name other than the default level name available during Tank.

Note Each Node name must be unique.

1. From the Movements window, click Nodes. The Nodes window appears. This window lists all nodes and lets you select one or more nodes.
2. Click on the desired node. The Node is highlighted and the Modify button is enabled.
3. Click Modify. The Node Name window appears as shown below.
4. Type in the new name and click OK.
5. The system returns you to the Nodes window, highlighting the new node name in alphabetical order. The Save button becomes enabled.
6. Click Save. The system saves your changes.



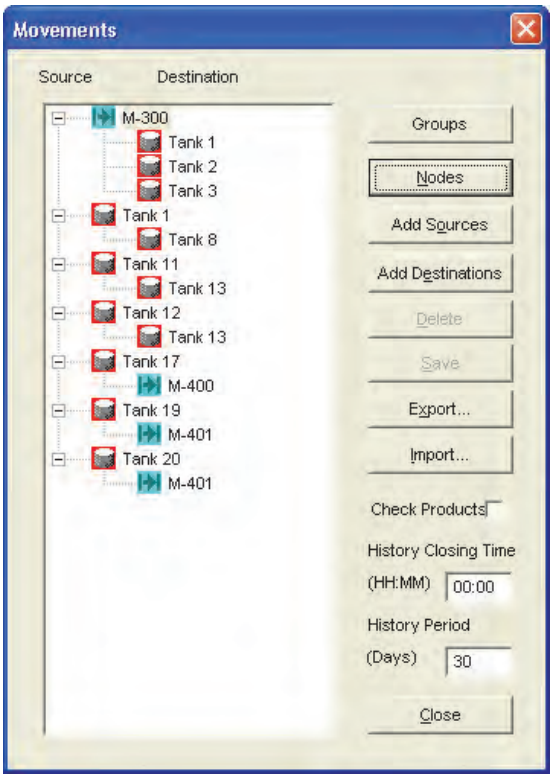
Deleting Nodes

Note Only those nodes that have not been assigned as a source or destination can be deleted. If you have chosen a node assigned as a source or destination the Delete button will not be enabled.

1. From the Movements window, click Nodes. The Nodes window appears. This window lists all the nodes.
2. Click one or more nodes. Use the <Ctrl> or <Shift> key to select multiple nodes.
3. Click Delete. The selected node or nodes are erased from the list.
4. Click Save to save changes.

Deleting Sources and Destinations

1. Select Movements from the Configuration menu bar. The Movements window appears as shown below. This window lists the defined Sources and associated Destinations. Each Source and corresponding Destinations constitutes possible movement line-ups. The contents are arranged in a tree-like format.



Note A Source can not be deleted until its corresponding Destinations are deleted.

2. Select the desired Source or Destination. The Delete button becomes enabled.
3. Click Delete. The system deletes the selection from the list.
4. Click Save to save changes.

Exporting & Importing Movement Elements

You can export movements from FuelsManager to a file, and import that file to another FuelsManager with the Movement Import/Export feature. You import and export the tank nodes, unit nodes, meter nodes, movements, and groups separately.

Note All nodes must exist in the workstation before you import movements. If you are transferring all elements of the movement system (tank nodes, unit nodes, meter nodes, movements, and groups), import the tank, unit, and meter nodes before the movements.

Exporting Movement Elements

You must export tank, unit, and meter nodes or movements separately. However, you use the same process for each of them.

1. From the Movements window, click Export. The Import/Export File Types window appears.
2. Select either Tanks, Units, Meters, Movements, or Groups and click OK. A window appears, asking for the filename and location for the export.
3. Select the directory for the export, enter the file name, and click Save. The system saves the selected movement information to the file.

Importing Movement Elements

You must import tank, unit, and meter nodes or movements separately. However, you use the same process for each of them.

1. Select Movements from the Configuration menu bar. The Movements window appears.
2. From the Movements window, click Import. The Import/Export File Types window appears.
3. Select either Tanks, Units, Meters, Movements, or Groups and click OK.
4. Select the directory for the export, enter the import file name, and click Open. The system imports the Tank nodes, Unit nodes, Movements, or Groups from the file.

9 Configuring the System Update Utility

If you are upgrading FuelsManager version 4.0, 4.1, or 4.2, you will need to update the database system to the 7.0 version. To do this, you need to run the FuelsManager System Update (FMSystemUpdate) utility.

If you are upgrading from version 6.0, you do not have to run the FuelsManager System Update utility.

The FuelsManager System Update utility will not update any version before version 4.0.

Before Updating Your Database

Before running the FuelsManager System Update Utility, do the following:

- Update your version of the FuelsManager Oil & Gas software to the latest version (version 7.0)
- Shut down FMSystemManager and do not restart it until after you have completed the update
- Make a backup copy of your existing FMProject database file
- If you have not already done so, copy the FMProject database you want to upgrade into the current FMProject folder.
- Important! Copy the FuelsManager.act file from your old ...\FuelsManager folder to the new ...\FuelsManager folder. If you do not do this, the update utility will not be able to update any of your user, user groups, or security permissions data

Items not updated

The FuelsManager System Update utility will not update previous versions of communications driver configurations. In order to upgrade this part of your configuration, you should export all the source assignments prior to starting the upgrade; upgrade your database using the FMSystemUpdate utility; recreate your communications configuration; then re-import the source assignments.

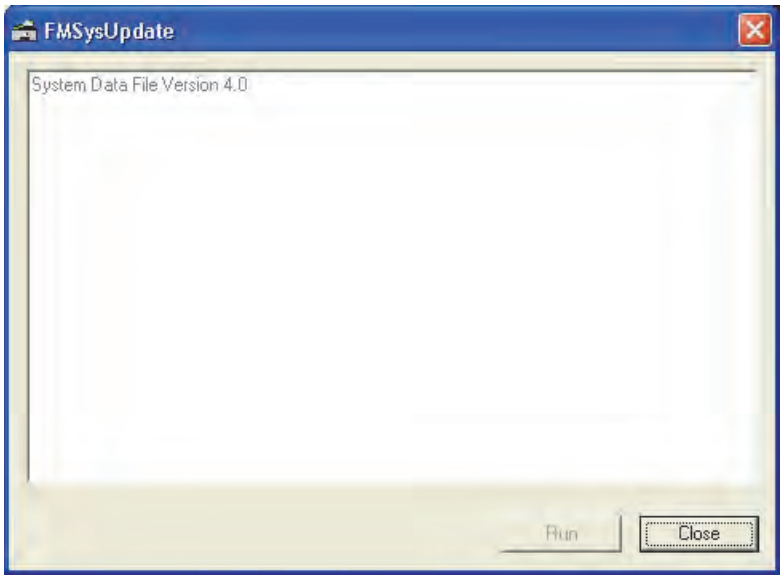
Alternately, you can update the software version-by-version, as described in the Troubleshooting section.

Running the Utility

1. Open the Utility from the Start Menu.

   Click Start and select Programs, FuelsManager, FMTools, and click FMSystemUpdate. This opens the FuelsManager System Update Utility. The FMSystemUpdate window appears as shown below.

   The utility recognizes versions 4.0, 4.1, and 4.2.



This means that the utility recognizes the file version on your machine and can update your system.

2. Click Run.

   Click Run to begin the update process.

3. Back up Files in Project.

   Before running the process, the system prompts you to back up your files in the project.

   Backing up these files only makes copies of the files that change during the update--not the entire project. Click Yes to back up these files and continue.

4. Finish Update.

   After backing up the project files, the system will automatically start the update. The window logs the updates:

   - Updating System Data
   - Updating Product Data
   - Updating Alarm Group Data
   - Updating DataManager and Movement Data
   - Updating Graphics Data

Update Complete

If the update is successful the last line of the log will display “Update Complete.” This means that the update was successfully performed and your system is now running the 6.0 database.

Update Failed

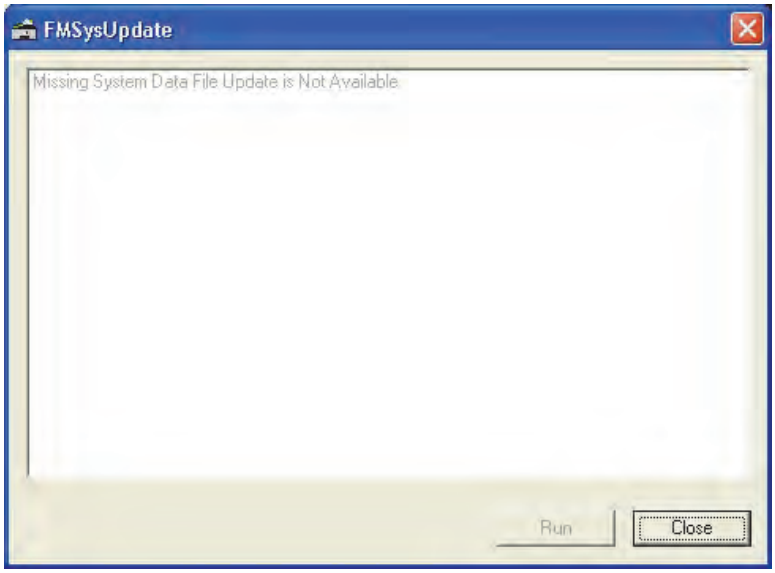
If the utility is unable to complete the update, the last line of the log will display “Update Failed.”

Error messages and troubleshooting

Error messages

Missing System File Update is Not Available

You may get this message in the FMSystemUpdate window as shown below.



This message means that either the utility does not recognize the system file as a version that it can update or that there are files missing. If your version is not 4.0, 4.1, or 4.2, the utility cannot update your database system. If this is so, the Run button is disabled.

System Data File Version 4.3

If the utility recognizes the version as 4.3 (System Data File Version 4.3), then the system is already updated and you do not need to run this utility. In this case, the Run button is also disabled.

Unsupported Graphic Revision in File: 3401.SYM

You will get this message if you created your graphics and symbols in a version previous to 4.0. This will not keep the update from successfully running. But you should make sure that your graphics and symbols are displaying correctly; and if not, manually correct them.

Database is Corrupt

You may get a “Database is Corrupt” message. This can reflect a couple situations:

- Any of your data files may be from a version previous to 4.0.
- Your data files are not consistent; you may have a 4.0 movement database and a 4.2 product database.

Whatever the reason is, the last update statement in the FMSystemUpdate window tells you where the corruption was found. For example, it may list the Movement Data database (MoveData.dat and MoveSchedule.dat).

Troubleshooting

- A possible solution to the Database is Corrupt error is to rename any database files that the update utility finds as corrupt. For example, in the screen above, rename the MoveData.dat to MoveDataold.dat and rename MoveSchedule.dat to MoveScheduleold.dat. By doing this, the utility will skip these renamed files--they are not updated automatically. After running the utility you need to manually update these data.
- You can also try updating the software version-by-version--4.0 to 4.1, then to 4.2, 4.3, and then 6.0 service pack 1. This will update the databases as you go along, negating the need to use the FM System Update utility.
- As a last resort you can install FuelsManager Oil & Gas 6.0 service pack 1 to a different CPU. This will require you to export all your tank points, resources, and strap tables from the old system and import them into the new one.

After Updating the Database

Rename Your Database as the Local Machine Name

If necessary, you can start FMSystemManager and run FMSystemConfig to rename the database to the local machine.

Checking Your System

After you upgrade your database system to 6.0 with the utility, open Configuration and verify that your groups, users, system permissions, and tag permissions are still working properly. Since some of the security rights definitions have changed, they may not match perfectly.

The update utility created a back-up copy of the old files that were changed. These files are located in the “Copy of FMProject” directory. This is not a complete back-up of your entire database, and includes only the files that were changed in the upgrade.

Rebuild Graphics and Reports

You will have to rebuild the following:

- Symbols
- Graphics
- Detail Mode Symbols
- Detail Mode Graphics
- Rebuild Reports

Back up FMProject

After doing all this you should and back up your new FMProject.

10 Creating Graphics

FuelsManager Draw is an application for developing custom graphic screens to display in the FuelsManager Operate. You can also use Draw to edit the tank detail graphics included in the FuelsManager package.

> Note The Draw feature is only available with FuelsManager Professional Edition. For information about upgrading to Professional Edition, contact your Varec representative.

Make sure that the DatabaseManager is not in SHUTDOWN mode. Otherwise, you will not be able to access the database windowes used to define values.

How Draw graphics are used in Operate

The figure below shows a site overview graphic for a bulk fuel storage facility. All of the elements in this graphic were created in Draw using lines, rectangles, bitmaps, bar graphs, values, and labels.

In this example, each tank name has an associated button (append) which, when clicked, displays a Tank Detail window. Tank levels are indicated by dynamic bar graphs representing the associated data point variables. Each valve indicates current status with standard color codes.

Command buttons may be added to each tank or valve that would open a standard FuelsManager Operator Command window. Operator Commands are defined for selected points in database edit. If defined, a window is displayed allowing the operator to enter a value or issue a command. In this example, the operator can issue valve open/close commands. The pipeline objects are animated such that they change color to indicate flow within the particular segment.

Opening and Exiting the Draw Application

Opening Draw

1. From the FuelsManager Configuration application, select the Draw Graphics command from the User Interface menu.
2. The Draw application window appears.

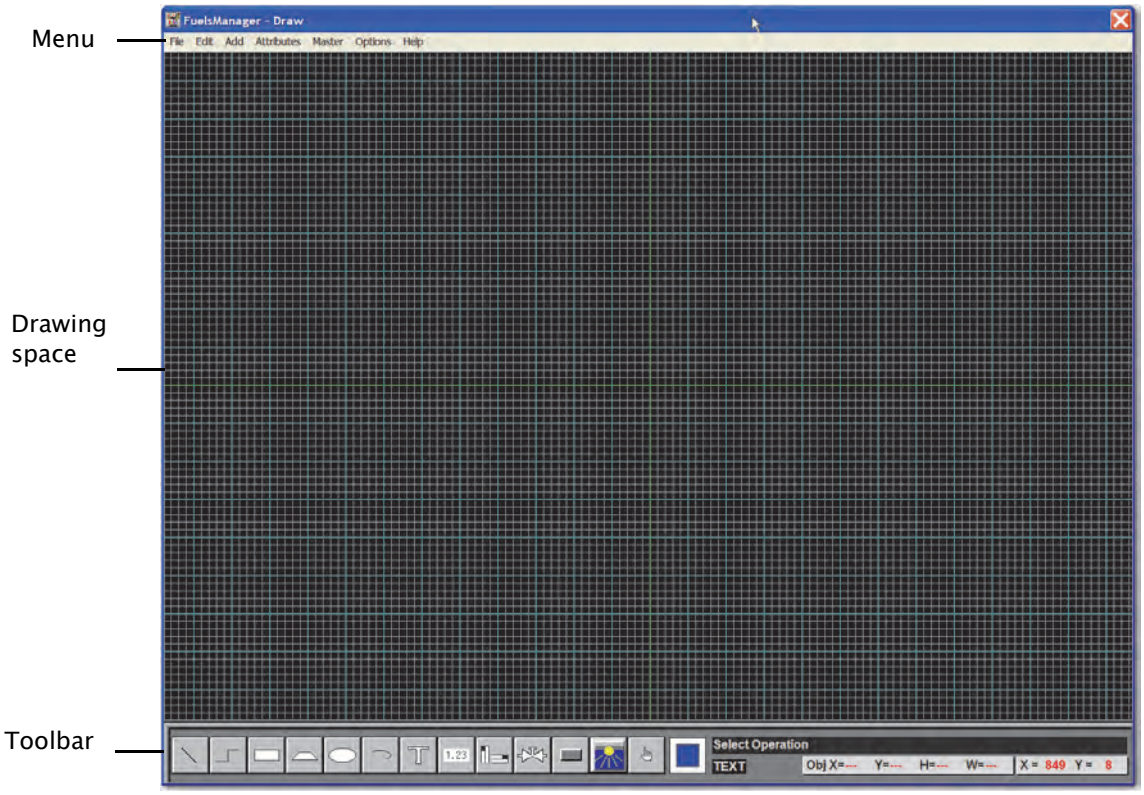
Exiting Draw

- Select Exit Draw from the File Menu.

Understanding the Draw window

This section describes the basic Draw window and components. This window consists of a drawing space, menu bar, and a toolbar.

Note Only one graphic or symbol may be opened at a time.

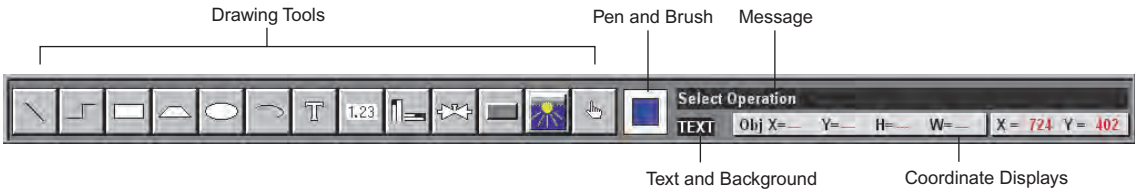


The Drawing space

The drawing space is the area where drawn objects are created and displayed. When you start Draw, the drawing space is empty. You have the option to use a grid to position objects or to draw with precision.

The Draw toolbar

A toolbar is displayed at the bottom of the window. The toolbar has been provided for easy access to the drawing tools. It also displays the current pen/brush color and background/text color, as well as a message box describing the function of the selected tool.



Drawing tool icons

These tools are also displayed as menu options in the Add menu. The functionality and procedures of each tool are described in Using the Draw Tools.

Pen & brush box

This box displays the default or current choice of pen (line) and brush (fill).

Message window

Whenever a tool is selected, the Message Window provides a brief description of the selected task. When no action is in progress (no tool has been selected), the Message Window displays “Select Operation.”

Text & background box

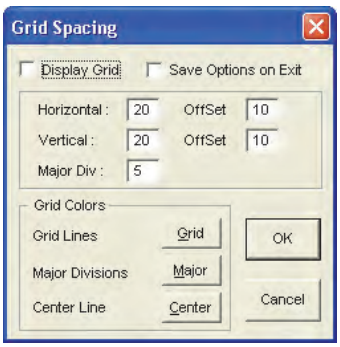
This box displays your current text and text background color as well as the bar graph color. The background refers to an opaque box and appears behind the text.

Setting Up the Drawing Space

Displaying and Setting Up the Grid

You can display a grid in Draw to precisely position objects on the screen, and to align objects with each other. When you drag objects with the mouse, the objects snap to the grid. This section describes how to turn the grid display on or off, and how to set the grid dimensions, position, and line colors.

1. From the Options menu, select Display Grid. The Grid Spacing window appears.



2. Enter or select the options as appropriate. Each field is described in the following table.

Field	Description
Display Grid	Select this checkbox to display the grid in the drawing area. Clear the checkbox to remove the grid from the display.
Save Options on Exit	Select this checkbox to save your grid settings when you exit the Draw application.
Horizontal	The number in this field determines the horizontal spacing (size) of each grid square, in pixels. For example, entering 5 causes each grid square to be 5 pixels wide.
Offset (Horizontal)	This field sets the number of pixels that the entire grid is offset horizontally from the center of the Draw drawing area. A positive offset moves the grid to the right; a negative offset moves the grid to the left. The offset number must be less than the number entered in the
Vertical	The number in this field determines the vertical spacing (size) of each grid square, in pixels. For example, entering 5 causes each grid square to be 5 pixels in height.
Offset (Vertical)	This field sets the number of pixels that the entire grid is offset vertically from the center of the Draw drawing area. A positive offset moves the grid down; a negative offset moves the grid up.
Major Div	Major divisions are colored horizontal and vertical lines separated by a specified number of grid squares. The number in this field determines how many grid squares separate each major division line.
Grid Lines: Grid	Click this button to change the color of the grid squares. Choose a color in the Select Operation window and then click OK. This setting does not change the color of the major division lines or the center lines.
Major Divisions: Major	Click this button to change the color of the major division squares. Choose a color in the Select Operation window and then click OK. This setting does not change the color of the grid lines or the center lines.

Field	Description
Center Line: Center	Click this button to change the color of the grid Center lines. Choose a color in the Select Operation window and then click OK. This setting does not change the color of the grid lines or the major division lines.

3. Click the OK button.

Showing appends

FuelsManager buttons (Appends) can be created as invisible buttons. In this manner they can be placed behind bitmaps or symbols representing tank objects or field devices. The user appears to be clicking the graphical object but in fact is clicking the invisible button. In Draw it is possible to show these invisible buttons by choosing the Show Appends command from the Options menu. When you select this option, all created buttons in the current file are automatically displayed. A check mark appears beside the option. To deactivate, select the option to erase the check mark.

Displaying mouse coordinates

This option is helpful in sizing objects equally or aligning objects. The X and Y coordinates displayed change as you move the cursor in the Drawing Space.

1. Select the Show Mouse Coordinates command from the Options menu.

   A coordinate display appears in the right hand portion of the Draw toolbar

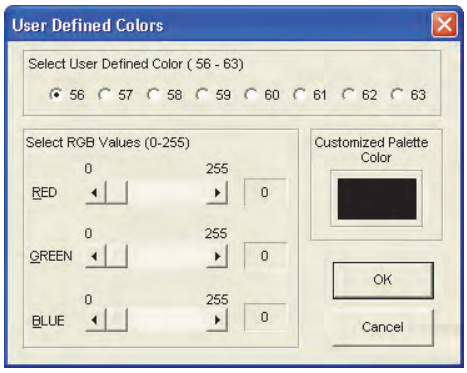
2. To deactivate the coordinate display, select Show Mouse Coordinates command from the Options menu again.

Displaying object coordinates

1. Select the Show Object Number command from the Options menu.
   - A coordinate display and Object Number appears in the right hand portion of the Draw toolbar
   - The “X=” displays the horizontal coordinate (or X coordinate) of the selected object.
   - The “Y=” displays the vertical coordinate (or Y coordinate) of the selected object.
   - The “H=” displays the height of the selected object.
   - The ”W=” displays the width of the selected object.

Creating user defined colors

1. Select User Defined Colors from the Options menu.
2. A warning message appears that changing user-defined colors can affect all graphics.
3. Click OK.
4. The User Defined Colors window appears.
5. The window lists the numbers 56 through 63 that are available.
6. In the Customized Palette Color box, the current color is displayed for the selected number radio button.
7. To change the current color, you can create a new color by selecting and moving the red, green and blue scroll bars.
8. All changes are displayed in the palette.
9. When finished, click OK. The user-defined colors are saved and now appear in the color palette.



Managing Graphic and Symbol Files

Opening an existing graphic or symbol

1. Select Open from the File menu to display the Open Graphic File window. This window displays the saved Symbol files (.SYM) and Graphic files (.GRF)
2. Select the desired file from the list box and click OK.
3. The graphic or symbol appears on the screen.

Understanding graphic and symbol file types

The Draw application uses two types of image files: graphics and symbols. Graphics are images that can be displayed in a Graphics tabbed window or floating window in Operate. Graphics can include static and dynamic elements, and include single-use graphics and template graphics.

Symbols are reusable static images that can be inserted into graphics.

FuelsManager graphic files can exist in two formats, .GRF and .GRT:

- .GRF files are saved by and used by the Draw application. A .GRF file cannot be viewed in Operate.

- .GRT files are generated GRF files that are optimized for display in Operate. Generating a .GRF file places it in the Graphics Index and makes it available for display in Operate. Draw also verifies all database connections in the .GRF file when you generate the file.

FuelsManager symbol files can exist in two formats, .SRF and .SRT:

- .SRF files are saved by and used by the Draw application. A .SRF file cannot be inserted in a Graphic (see .SRT file).
- .SRT files are generated SRF files. Generating a .SRF file places it in the Symbol Index and makes it available for insertion in graphics.

Before You Begin

Before you create a graphic or template graphic, you should:

- Create a sketch of the graphic. Include in this sketch a list of database points and corresponding variables that will be represented in the graphic. Note which points have defined alarms and note the data point types.
- Create any new symbols (if not available in the Symbol index) that will be used in the new graphic, as described on page 155.
- For a template graphic, identify the database points that should be available for dynamic association with the graphic.

Creating a graphic

1. Select New Graphic from the New sub-menu in the File menu.
2. Set the size of the graphic as described in section , "Setting the size of a graphic" on page 154.
3. Build the graphic using the techniques described in this chapter, including section , "Using the Draw Tools" on page 158 and section , "Using Dynamic Conditions" on page 173.
4. Save the graphic by selecting Save As from the File menu. Enter the graphic name including the GRF file extension.
5. Generate the file as described in section on page 155. You must generate a graphic or template graphic before it can be displayed in Operate.

   Note Draw verifies database connections when generating a file. If you do not have access to the database or databases associated with the graphic, do not generate the file. The file must be generated at a later time, before it can be displayed in Operate.

Creating a template graphic

A template graphic is a graphic that is dynamically associated with a database point when it is opened in Operate. A template graphic can be opened in one of three ways: with an Append button (see section on page 165), through a selection by a user in Operate, or when an alarm occurs (see section , "Assigning an Alarm Graphic to an Alarm" on page 56).

1. Select New Template Graphic from the New sub-menu in the File menu.
2. Set the size of the graphic as described in section , "Setting the size of a graphic" on page 154.
3. Build the graphic using the techniques described in this chapter, including section , "Using the Draw Tools" on page 158.
4. Determine which database points can be dynamically associated with this template graphic by selecting Template Database Defines from the Edit menu.

5. Save the graphic by selecting Save As from the File menu. Enter the graphic name including the GRF file extension.
6. Generate the file as described in section on page 155. You must generate a graphic or template graphic before it can be displayed in Operate.

   Note Draw verifies database connections when generating a file. If you do not have access to the database or databases associated with the graphic, do not generate the file. The file must be generated at a later time, before it can be displayed in Operate.

Defining Templates for a Template Graphic

Before a template graphic can be displayed in Operate, you must define which database points can be dynamically associated with the graphic when it is displayed. This can be done in two ways with Draw:

- By opening the template graphic and selecting a menu command, as described in the procedure in this section
- During the creation or editing of an append. When you select a template graphic for the append, you can also add database points to those already defined for the selected graphic. See section on page 168 or section on page 169 for more information.

1. Open the template graphic.
2. Select Template Database Defines from the Edit menu. The Template Database Definitions window appears.
3. Identify a point by doing one of the following:
   - Click the Browse button in the lower right corner of the window. In the Database Edit window, select the appropriate tank point, and then click Select.
   - Enter the appropriate information for the database point in the System, Template Description, and Path fields.

     You may want to enter values manually if you are creating a template graphic before the database has been built, or if you are developing the graphic on a machine that does not have access to the site database. Draw does not verify database connections until the file is generated.
4. Click the OK button.
5. Save the file as described on page 157.
6. If appropriate, generate the file. Graphics must be generated before they can be displayed in Operate. For detailed instructions see page 155.

   Note Draw verifies database connections when generating a file. If you do not have access to the database or databases associated with the graphic, do not generate the file. The file must be generated before it can be displayed in Operate.

Setting the size of a graphic

In Draw, you can determine how each FuelsManager graphic is sized when it is displayed in Operate by associating one of the following settings with the graphic:

- Use Client Area – graphic appears in a tabbed window and is automatically sized to fit the window area. This is the default setting.
- Floating Graphic – graphic appears in a separate window that appears above the Operate tabbed window display.
- Fixed Size Graphic – graphic appears in a tabbed window but has a fixed size independent of the window size.

1. Select Graphic Size Options from the Edit menu item.

2. Select one of the options. If you select Floating Graphic or Fixed Size Graphic, enter the exact size for the graphic in pixels in the Width and Height fields.

   Caution If you change a 'Use Client Area' graphic to a Floating or Fixed Size graphic, elements in the graphic could be lost if you set a smaller size for the graphic.

3. Click the OK button.

Creating a symbol

1. Select New Symbol from the File menu item.
2. Construct the symbol using the geometric tools as well as other symbols.
3. Save the symbol by selecting Save As from the File menu. Enter the symbol name including the SYM file extension. Once the symbol is saved, you must generate the file.
4. Select Generate Run Files from the File menu. If an entry does not exist in the Symbol Index (in the Master menu item), a window appears asking if you want to create one.
5. Click Yes. The Edit Symbol Index window appears. Type in a description of the symbol in the Description text box.
6. Click OK to display the Select Symbol Index Entry window.
7. Generate the file as described in section . You must generate a symbol before it can be used in a graphic.

Generating files

Before a graphic created in Draw can be displayed, it must be generated to create a file that is optimized for the Draw application. Generating a symbol makes it available for placement in a graphic.

During generation, FuelsManager checks all dynamic data records to verify the validity of all point names and variables used in your graphic.

1. Select Generate Run Files from the File menu item.
2. The system displays a message box advising you that it is verifying the point dynamics of your graphic.
3. If there is not already an entry in the Graphic Index (in the Master menu item) for your graphic, a window appears asking if you want to create one.
4. Click Yes.
5. The Edit Graphic Index window appears.
6. Type in a description of the graphic in the Description text box. If you click on the Preload on Start option box, Operate loads the graphic into memory on startup rather than accessing it from disk when the display is requested, this can improve performance when switching between graphics on slower systems.
7. Click OK to display the Select Graphic Index Entry window. The graphic that has been generated as a run file is now listed in the Master Index. Now the graphic will be available to the Operate program.

   Note Any time changes are made to a graphic or symbol, it has to be regenerated.

Generating multiple files

Before a graphic created in Draw can be displayed, it must be generated to create a file that is optimized for the Draw application. If you have more than one file to generate, you can save time by using one of the procedures in this section.

During generation, FuelsManager checks all dynamic data records to verify the validity of all point names and variables used in each graphic.

1. Select Batch Run Files from the File menu item. Select either graphics or symbols. The Batch Compile window appears for either graphics or symbols. The Altered Files list box displays all files that have been modified since the last compilation.
2. Select the files for generation. To select all the files in the list box, click Select All. Clicking Unselect All deselects the files.
3. Follow one of the below procedures.

Using "Do Selected" command

1. Click the Do Selected command. A window appears asking you to confirm your request to compile all selected files.
2. Click OK to proceed with the compilation of the files you have selected.

Using "Make" command

Note This generation process does not prompt you if the graphic is not in the Graphic Index. You must use the Master menu to add graphics to the index.

1. Click Make command. A window appears asking you to confirm your request to compile all altered files.
2. Click OK. This option generates all files that have changed since last generated. This option is useful if you are unsure of which files have been modified.

Using "Build All" command

1. The Build All option is useful for either initial project development or if the system database has been modified. System database modification often requires re-verification of database references.
2. Click Build All. A window appears asking you to confirm your request to compile all files.
3. Click OK. This option unconditionally compiles all files for a project, even if they have not changed since the last generation.

Using file indexes

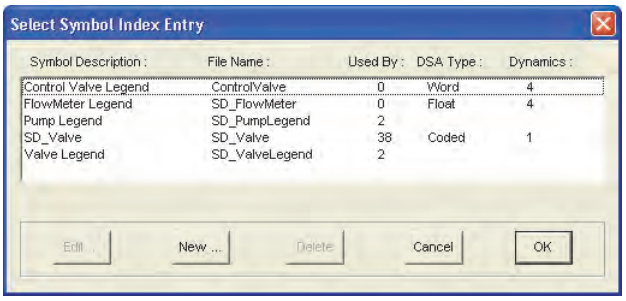
The Draw application uses indexes to record graphics, symbols, and conditions that are ready for use. You can manage these indexes to view, edit, or delete the items listed, and to add new items.

- The Graphic Index all of the generated graphics that can be displayed in the Operate program.
- The Symbol Index includes generated symbols; symbols in the index can be inserted into graphics.
- The Conditions Index includes dynamic conditions that can be applied to objects in graphics.

Opening an index

Each time that you need to select a generated graphic or symbol in Draw, or apply a condition to a graphic, an index window is shown. You can also use the Master menu to access the indexes directly.

- On the Master menu, click Graphic Index, Symbol Index, or Condition Index.



Renaming a Graphic or Symbol in the Index

The description that you enter for to each graphic and symbol in Draw is the name that is displayed in Operate. This name is independent of the file name. You can change this descriptive name using this procedure.

1. On the Master menu, select Graphic Index, or Symbol Index.
2. Select the graphic or symbol entry in the list.
3. Click the Edit button. Change the Description field entry and then click the OK button.

Generating a Saved Graphic or Symbol Using the Index

1. On the Master menu, click Graphic Index or Symbol Index.
2. Select the graphic or symbol entry in the list.
3. Click the New button. The Edit Graphic Index or Edit Symbol Index window appears showing a list of files that have not been generated.
4. Select a graphic or symbol in the File list, and enter a description for the file in the Description field. Click OK. The graphic now appears in the index list with the description that you entered.

Editing a condition using the Condition Index

1. On the Master menu, click Condition Index.
2. Select the graphic or symbol entry in the list.
3. Click the Edit button.
4. In the Edit Dynamic Conditions window, make any changes necessary, and then click OK. See “Editing a Dynamic Condition” on page 176 for detailed instructions.

Saving files

The Save As command saves a file for the first time. This option is also used to save the opened file under a different name. The Save command saves changes to an existing file. Save As is particularly useful when you have created a complex display that you want to use again with minor modifications.

Purging files

The Purge option enables you to delete unwanted symbols and graphic files from your system. When you purge a file, the Symbol and Condition Indexes are updated accordingly.

> Note You should not delete graphic or symbol files from the project folder using Windows Explorer. Doing so will remove the File but the symbol and condition indexes will not reflect the deletion. Instead, use the Purge option.

Merging files

Draw allows you to merge previously created files with the file in which you are currently working.

You cannot merge template graphics.

1. Click Merge File from the File menu item. Point and click on the location where you want the merged file to appear.
2. Drag the mouse to create a box where the merged file appears. The Merge Graphic File window appears.
3. Type the name of the file you wish to merge, or select one from the File list box.
4. Click OK to complete the operation and return to the current display screen.

Using the Draw Tools

Below is an example of a custom graphic of a fuel tank facility.

Basic Techniques

Before you begin creating a graphic, make yourself familiar with the following commands or functionality.

Command/ Functionality	Description
Undo	To undo the last operation, select Edit and click Undo Last.
Delete	If you need to erase an object, click the Edit button and select the object. Click Delete from the Edit menu.
Object color	Before drawing an object, you may want to set a default color or style. This process eliminates having to select the object and modify the attributes from the Edit menu item. Refer to the Setting Defaults section.
Changing tools	The existing tool does not change until another button is selected.

Note Holding down the SHIFT key while drawing forces orthogonal movement of the line.

The standard geometric tools provided by Draw include the line, rectangle (square), polygon, ellipse (circle) and arc. The tools are available in the toolbar and in the Add menu.

Changing the Default Settings

Draw allows you to set or change various default settings of any object. These defaults apply to text font, size and color; text background mode and color; pen color, thickness and appearance; and brush style and color. These defaults can be set in the Attributes menu.

- From the Attributes menu, select the appropriate command to change the default setting.

Setting the default font

1. From the Attributes menu select Text Font.
2. The Select Text Font window appears.
3. Select the desired font, size, and attributes.
4. This default applies to any text created such as labels and values.

Setting the default text color

1. From the Attributes menu select Text Color.
2. The Set Default Text Color window appears.
3. Selecting Palette from the Set Default Text Color window displays all the colors available.
4. This default applies to any text created such as labels and values.

   Note The Text Color & Background Box displays your new choice of color. This color remains the same until the default is changed.

Setting the default background mode

1. From the Attributes menu select Background Mode to display a cascading menu.
2. A check mark appears next to the current default mode.
3. The Text Color & Background Box display changes when you choose transparent.

Setting the default background color

1. From the Attributes menu select Background Color to display the Set Default Background Color window.
2. Selecting Palette from the Set Default Background Color window displays all the colors available for the background color.

Notice the change in color in the Text Color & Background Box

Setting the default pen attributes

1. From the Attributes menu select Pen Attributes.
2. Assign a palette color.
3. Select a line type – invisible, dashed or dotted.
4. Change the line width.
5. The change is displayed in the Pen & Brush Box.

Setting the default brush attributes

1. From the Attributes menu select Brush Attributes.
2. The brush may be any available palette color or may be hollow to allow objects with just a border.
3. In addition, the brush may be hatched (horizontal, vertical or diagonal) or patterned.
4. The change is displayed in the Pen & Brush Box.

Drawing Simple Shapes

Note To move or modify an object, see "Selecting an object" on page 171.

Drawing a line

The Line tool draws straight lines at any angle.

1. Select the Line tool (or select Add and click Line). Click on area to define start point.
2. Drag the cursor and release at desired length.

Drawing a polyline

The Polyline tool draws multiple connected lines grouped as a single object.

1. Select the Polyline tool (or select Add and click Polyline).
2. Click on area to define first point.
3. Move the cross-hair cursor to the next point and click again.
4. As you move and click, the polyline appears. Clicking the right mouse button deletes the last line segment.

   Note Holding down the SHIFT key while drawing forces orthogonal movement of the line (vertical, horizontal or at 45 degrees from previous point).
5. Repeat above step for each additional point.
6. After the last point, press the ENTER key to complete the polyline.

Drawing a rectangle

The Rectangle tool draws rectangles and squares.

1. Select the Rectangle tool (or select Add and click Rectangle). Click on area to define the first corner.
2. Drag the cursor and release the mouse button at desired size.

   Note To draw a square, follow the procedure for drawing a rectangle and hold down the Ctrl key while you drag the cursor.

Drawing a polygon

Use the Polygon tool to draw polygons (multi-sided closed objects). You can create polygons with up to 25 points (24 clicks).

1. Select the Polygon tool (or select Add and click Polygon). Click on area to define first point.
2. Move the cross-hair cursor to the next point and click again.
3. Repeat this step for each additional point of the polygon. Holding the SHIFT key while drawing forces orthogonal movement of the line from the previous point.
4. Press Enter to connect the last point and the first point.

Drawing an ellipse

The Ellipse tool draws ellipses and circles.

1. Select the Ellipse tool (or select Add and click Ellipse).
2. Click on area to define center point and hold down the mouse button.
3. Drag the cursor in a diagonal direction to create the ellipse.
4. Release the mouse button at desired size and shape.

   Note To draw a circle, follow the procedure for drawing an ellipse, except hold down the Ctrl key while you drag the cursor.

Drawing an arc

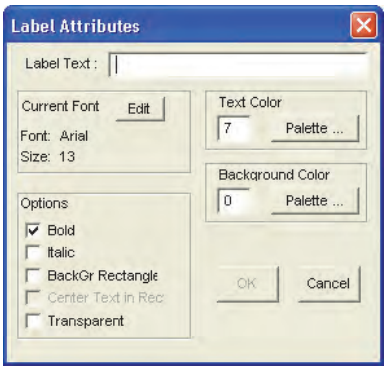
The Arc tool draws arcs and chords (filled arcs).

1. Select the Arc tool (or select Add and click Arc/Chord). Click on area to define center point and hold down the mouse button.
2. Drag the cursor to make an ellipse for the arc and then release the mouse button at desired size and shape.
3. Position the cursor on the ellipse where you want the arc to start and hold down the mouse button. The Message Window directs you to “Define Arc End Point”. Drag cursor to point on ellipse where you want the arc to end and release the mouse button.

Drawing a label

A Label is used to place text inside the graphic. Labels may be left, center or right justified and may include an optional background rectangle. Also, you have a choice of fonts and various sizes.

1. Select the Label tool (or select Add and click Label).
2. Click on area of insertion.
3. The Label Attributes window appears.



1. Enter the Label name, format appearance of the label or set up the label alignment.
2. Click Edit to format the font appearance of the label.
3. Center Text in Rectangle only applies when Back Ground Rectangle is used.
4. Select a text and text background rectangle color by clicking on Palette button. The edit box displays the number assigned to each color in the palette.
5. Click OK. A label appears in selected area.

Inserting a value

The Value tool provides a way to display the value of a FuelsManager database point variable in a graphic as text. To create a Value, you select the database point variable to associate with the Value, and you define how the Value will appear.

Note The default font attributes also apply to the Value object.

When you create a dynamic object such as a Value in a Template Graphic, the database point variable that you assign to the object is relative by default. The database point will be selected dynamically when the graphic is opened, and the Value of the variable for that point.

You also have the object of making the assignment absolute so the value is always associated with the point variable that you select.

For more information, see “Creating a template graphic” on page 153, and “Placing an append button in a graphic” on page 165.

1. Select the Value tool (or select Add and click Value).
2. Click in the drawing area. A window appears for selecting the database point variable reference for the value.

   If you are working with a regular graphic, go to step 3. If you are working with a Template Graphic, go to step 4.

3. If you are building a regular graphic, use the Database Edit window to select a database reference for the value as follows:
   a. If you need to select a different database, click the Database button.
   b. Under Point Name, navigate to the correct tank point by selecting an entry and using the Next Level or Prev Level buttons.
   c. Click the Select button. The Select Database Point Variable window appears showing your point selection.
   d. If the Variable selection shown is not correct, click the Variable button and choose a variable in the Select Point Variable window, then click the Select button.
   e. If any settings are incorrect, click the appropriate button(s) to correct the settings.

f. Click the OK button. The Value Attributes window appears.

4. If you are building a template graphic, use the Template Configuration Dialog window to select the database reference for this object. Define the reference as follows:

   a. Select the database reference for the object by using one of these methods:
   Click the Browse button and select a database point, then click the OK button. The Tag Name, Point Type, Variable, and Format fields display your selection.

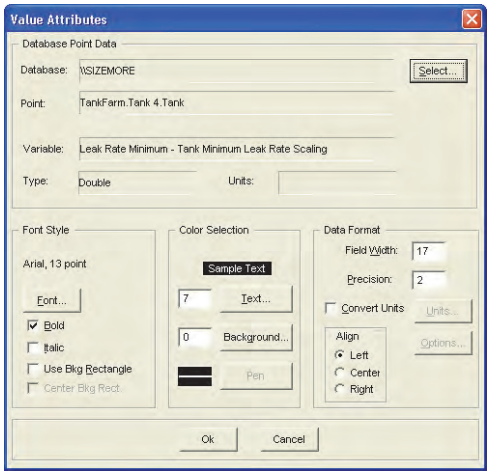
   Alternatively, use the Tag Name, Point Type, Variable, and Format fields and buttons to manually define the point. This may be necessary if your system does not have access to the appropriate site database, or if the database has not been created.

   b. To display quality codes with the data in Operate, select Display Quality Data.

   c. To make this an absolute reference, select Absolute Point Path. When you select this option, the value will always point to selected database point and value.

   d. If any settings are incorrect, click the appropriate button(s) to correct the settings.

   e. Click the OK button. The Value Attributes window appears.



5. Set the value appearance, formatting and the positioning of the value

6. Click the OK button. The value appears in the selected area

Inserting a bar graph

The Bar tool is used to draw a vertical, horizontal or deviation bar graphs based on the range of a FuelsManager database point variable. To create a bar graph, you select the database point variable to associate with the graph, and you define how the graph will appear.

When you create a dynamic object such as a bar graph in a Template Graphic, the database point variable that you assign to the object is relative by default. The database point will be selected dynamically when the graphic is opened, and the Value of the variable for that point.

You also have the object of making the assignment absolute so the value is always associated with the point variable that you select.

For more information, see “Creating a template graphic” on page 153, and “Placing an append button in a graphic” on page 165.

1. Select the Bar tool (or select Add and click Bar). Click on area to define the corner and hold down the mouse button.

2. Drag the cursor to end position and release the mouse button. A window appears for selecting the database point variable reference for the bar graph.

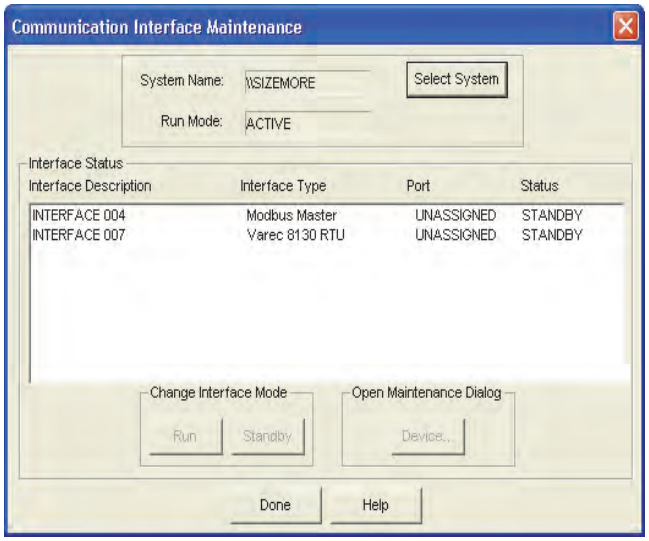
If you are working with a regular graphic, go to step 3. If you are working with a Template Graphic, go to step 4.

3. If you are building a regular graphic, use the Database Edit window to select the database reference for the object as follows:
   a. If you need to select a different database, click the Database button.
   b. Under Point Name, navigate to the correct tank point by selecting an entry and using the Next Level or Prev Level buttons.
   c. Click the Select button. The Select Database Point Variable window appears showing your point selection.
   d. If the Variable selection shown is not correct, click the Variable button and choose a variable in the Select Point Variable window, then click the Select button.
   e. If any settings are incorrect, click the appropriate button(s) to correct the settings.
   f. Click the OK button. The Dynamic Bar Attributes window appears.

4. If you are building a template graphic, use the Template Configuration Dialog window to select the database reference for this object as follows:
   a. Select the database reference for the object by using one of these methods:
   Click the Browse button and select a database point, then click the OK button. The Tag Name, Point Type, Variable, and Format fields display your selection.

   Alternatively, use the Tag Name, Point Type, Variable, and Format fields and buttons to manually define the point. This may be necessary if your system does not have access to the appropriate site database, or if the database has not been created.
   b. To display quality codes with the data in Operate, select Display Quality Data.
   c. To make this an absolute reference, select Absolute Point Path. When you select this option, the value will always point to selected database point and value.
   d. If any settings are incorrect, click the appropriate button(s) to correct the settings.
   e. Click the OK button. The Dynamic Bar Attributes window appears.

5. In the Dynamic Bar Attributes window, define the attributes of the bar graph such as color and style. You can also edit the data source for the bar graph.



1. Select Brush to select the color, pattern, and style of the bar fill. Select Pen to select the color, size, and style of the outline. Select Color to select the background color of the bar graph. Select either the Horizontal or Vertical option and corresponding Reverse Dir and Deviation option.

2. Select Use Variable Limits to have the bar graph object automatically track the minimum and maximum scaling limits of the database point it is linked to. If you wish to set the bar graph's minimum and maximum limits independently of the associated database point, clear the Use Variable Limits check mark.

   Note To bring the bar graph forward over a symbol, click Pull to Front from the Edit menu.

Placing a symbol in a graphic

The Symbol tool adds a symbol from the Symbol Index. The Symbol Index displays all standard and user-defined symbols.

1. Select the Symbol tool (or select Add and click Symbol). Click on area to define corner.
2. Drag the cursor to size the symbol and release the mouse button.
3. The Select Symbol Index Entry window appears.
4. Select a symbol and click OK.
5. The symbol appears.

Placing an append button in a graphic

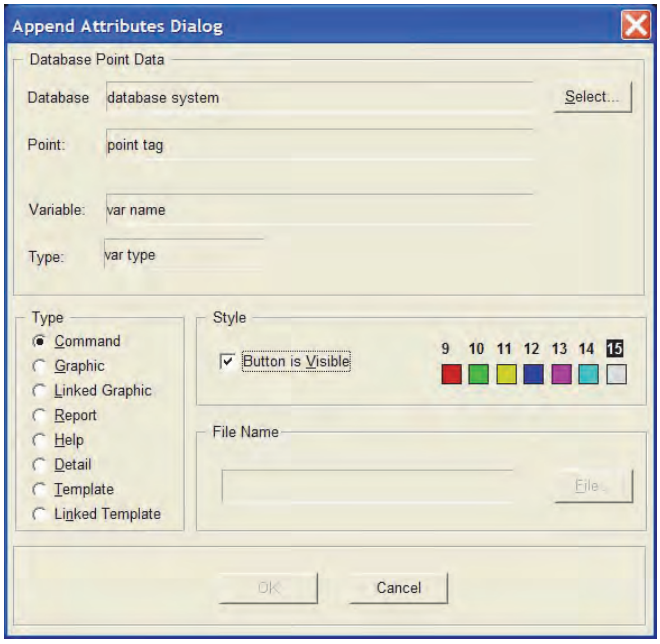
You can use the Append tool to add a command button, called an append, to a graphic. When a user views the graphic in Operate and clicks on the append, the action that you associated with the append will occur.

You can set appends to appear as visible buttons, or you can make them invisible and use them with other graphic elements. By placing an invisible append over a valve icon, for example, you can make something occur when the operator clicks on the picture of the valve in Operate.

You can also use appends to refer to a dynamic template graphic. For example, you may want to allow operators to obtain detailed information for any of the 50 valves in a refinery by clicking on a picture of a valve in the site graphic. You can create one generic template graphic to show the valve information, and then create an append for one of the valve points. This can be done quickly by creating one append and then copying and modifying it for each valve. When an operator clicks on one of the valves in Operate, of these appends, the template graphic will open to for the selected valve.

Refer to the following list to set up the appropriate append type:

For this action ...	Use append type	As Described on
Issue a command, such as opening or closing the valve.	Command	page 166
Open a graphic (in a tabbed window or in a separate floating window).	Graphic	page 166
Open a floating graphic that closes when the parent graphic closes.	Linked Graphic	page 167
Open a report.	Report	page 167
Open text or Windows Help.	Help	page 167
Display the Tank Detail for a selected tank.	Detail	page 168
Open a template graphic, referencing a database point that you select.	Template	page 168
Open a floating template graphic, referencing a database point that you select. Closes with parent graphic.	Linked Template	page 169



Creating a Command append

A command append displays an Operator Command window when clicked. From the window, the operator can issue a command or type in a new value.

1. Select the Append tool (or select Add and click Append). Click on area to define corner and hold down mouse button.
2. Drag the cursor to define the size of the append and release the mouse button. The Append Attributes window appears.
3. To display the append as a visible button in your graphic, click the 'Button is visible' under Style, and then select a button color.
4. Under Type, select the Command option.
5. Under Database Point Data, in the upper right corner of the window, click the Select button. The Select Database Point window appears.
6. Select the appropriate database, point, and corresponding variable by clicking the Database, Point or Variable buttons. Refer to the Values section for more information.
7. Click the OK button.
8. Click the OK button.

Creating a Graphic append

A graphic append button displays a selected graphic in a tabbed window when clicked.

You can use a Graphic append to open a full-sized, fixed-size, or floating graphic (see page 154), with the exception of template graphics. If the graphic that you open is not a floating graphic, clicking the append button closes the graphic that contains the append.

1. Select the Append tool (or select Add and click Append). Click on area to define corner and hold down mouse button.
2. Drag the cursor to define the size of the append and release the mouse button. The Append Attributes window appears.
3. To display the append as a visible button in your graphic, click on the 'Button is visible' under Style, and then select a button color.

4. Under Type, select the Graphic option.
5. Click File in the File Name group box. The Select Graphic Index Entry window appears.
6. Select a file from the list and then click OK to return to the Append Attributes window.
7. Click the OK button.

Creating a Linked Graphic append

A Linked Graphic append button opens a floating graphic when clicked. The floating graphic is linked to the parent graphic: it remains open while the parent graphic – the graphic that contains the append button – remains open. If the operator closes the tabbed window for the parent graphic, the linked (floating) graphic closes also.

For more information about floating graphics, see page 154.

1. Select the Append tool (or select Add and click Append). Click on area to define corner and hold down mouse button.
2. Drag the cursor to define the size of the append and release the mouse button. The Append Attributes window appears.
3. To display the append as a visible button in your graphic, click on the 'Button is visible' under Style, and then select a button color.
4. Under Type, select the Linked Graphic option.
5. Click File in the File Name group box. The Select Graphic Index Entry window appears, showing the floating graphics in the index.
6. Select a file from the list and then click OK to return to the Append Attributes window.
7. Click the OK button.

Creating a Report append

A Report append button displays a report when clicked. Refer to Chapter 15 for information about FuelsManager reports.

1. Select the Append tool (or select Add and click Append). Click on area to define corner and hold down mouse button.
2. Drag the cursor to define the size of the append and release the mouse button. The Append Attributes window appears.
3. To display the append as a visible button in your graphic, click on the 'Button is visible' under Style, and then select a button color.
4. Under Type, select the Report option.
5. Click File in the Report File Name group box. The Select Report Index Entry window appears.
6. Select a file from the list and click OK to return to the Append Attributes window.
7. Click the OK button.

Creating a Help append

A Help append button displays plain text help in an Operate window, or a single topic in a Windows Help file when clicked. You can use a Help append to direct the operator to perform a specific task.

Before you can refer to a help file with an append button, the file must have the proper extension, and it must be stored in the \\FuelsManager\FMProject\Graphics folder. Plain text files must have a .htx extension.

If you will be using a Windows Help file, you must know the context ID for the topic that you want to show to the user.

1. Select the Append tool (or select Add and click Append). Click on area to define corner and hold down mouse button.
2. Drag the cursor to define the size of the append and release the mouse button. The Append Attributes window appears.
3. To display the append as a visible button in your graphic, click on the 'Button is visible' under Style, and then select a button color.
4. Under Type, select the Help option.
5. Click File in the Help File Name group box. The Select Help File window appears.
6. Do one of the following:
   - To use a Windows Help file, select the Windows Help Format checkbox. Enter the context ID for the appropriate Help topic in the Context box.
   - To use a plain text file, ensure that the Windows Help file checkbox is cleared.
7. Select a file from the list and click OK to return to the Append Attributes window.
8. Click the OK button.

Creating a Detail append

A Detail append button displays the Tank Detail for a selected tank when clicked. This option button is used when more information relating to a tank needs to be displayed.

1. Select the Append tool (or select Add and click Append). Click on area to define corner and hold down mouse button.
2. Drag the cursor to define the size of the append and release the mouse button. The Append Attributes window appears.
3. To display the append as a visible button in your graphic, click on the 'Button is visible' under Style, and then select a button color.
4. Under Type, select the Detail option.
5. Under Database Point Data, in the upper right corner of the window, click the Select button. The Select Database Point window appears.
6. Select the appropriate database, point, and corresponding variable by clicking the Database, Point or Variable buttons. Refer to the Values section for more information. The tank point selected is the tank that will appear in the tank detail.
7. Click the OK button.
8. Click the OK button.

Creating a Template append

A template append button opens a template graphic file for a specific database point.

This is the primary method for accessing template graphics for your site. You can create multiple append buttons that point to a single template graphic, but each button is associated with a different database point. When the operator clicks one of these append buttons, the template graphic appears showing the data for the selected point.

For example, operators in an area of ABC Refinery must monitor the status of over 50 valves. All the valves are shown in a complex site graphic. With Draw, you can create one generic template graphic to show detailed valve information. You can then place an invisible append over each valve icon in the site graphic. Each append opens the template graphic for the matching valve point. When an operator clicks on one of the valves in the site graphic in Operate, the valve details graphic is displayed for that valve.

> Note To quickly create multiple appends for a template graphic, create one append, and then copy and modify that append for each reference point.

You must define one or more template graphics before performing this procedure. Refer to section on page 153 for more information.

1. Select the Append tool (or select Add and click Append). Click on area to define a corner and hold down the mouse button.
2. Drag the cursor to define the size of the append and release the mouse button. The Append Attributes window appears.
3. To display the append as a visible button in your graphic, click on the 'Button is visible' under Style, and then select a button color.
4. Under Type, select the Template option.
5. Click File in the File Name group box. The Template Graphic Database Select window appears.
6. In the upper list box, under Graphic Description, select the template graphic that you want to open with the append button. When you select a graphic, the database points defined as options for this template graphic appear in the lower list box. These are referred to as Template Database Defines.
7. In the lower list box under Template Description, select the database point to associate with this append button.
   - If the point that you want to associate with the append is not listed, you can add it by clicking the Browse button. Select the point and click the OK button. You can now select this point.
8. Click the OK button. The Append Attributes Dialog window appears, showing the graphic file name and the selected point under File Name.
9. Click the OK button. The append is placed in the drawing.

Creating a Linked Template append

This option button opens a floating template graphic when the append is clicked. The floating graphic is linked to the parent graphic: it remains open while the parent graphic – the graphic that contains the append button – remains open. If the operator closes the tabbed window for the parent graphic, the linked template floating graphic closes also.

You must define one or more floating template graphics before performing this procedure. Refer to section on page 153 for more information.

1. Select the Append tool (or select Add and click Append). Click on area to define corner and hold down mouse button.
2. Drag the cursor to define the size of the append and release the mouse button. The Append Attributes window appears.
3. To display the append as a visible button in your graphic, click on the 'Button is visible' under Style, and then select a button color.
4. Under Type, select the Linked Template option.
5. Click File in the File Name group box. The Template Graphic Database Select window appears.
6. In the upper list box, under Graphic Description, select the template graphic that you want to open with the append button. When you select a graphic, the database points defined as options for this template graphic appear in the lower list box. These are referred to as Template Database Defines.
7. In the lower list box under Template Description, select the database point to associate with this append button.
   - If the point that you want to associate with the append is not listed, you can add it by clicking the Browse button. Select the point and click the OK button. You can now select this point.

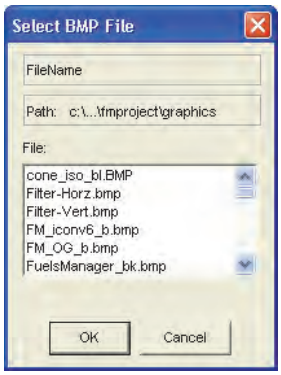
8. Click the OK button. The Append Attributes Dialog window appears, showing the graphic file name and the selected point under File Name.
9. Click the OK button. The append is placed in the drawing.

Inserting a bitmap

The Bitmap tool is used to insert a *.BMP file. Bitmaps can be used to represent equipment such as tanks, pumps, valves, and pipeline segments; to include images such as company logos and emblems; or to include digital photographs such as plant overviews.

Note FuelsManager includes various Bitmaps that were used to create the predefined Tank Detail and Tank Group displays. These are located in the Detail folder and Graphics folder respectively. Additional bitmaps can be located in the \Templates folder on your FuelsManager CD.

1. Select the Bitmap tool (or select Add and click Bitmap). Click on area of insert to define corner.
2. Drag the cursor to define an area within which the symbol will be located and release the mouse button.
3. The Select BMP File window appears.
4. Click on the desired file and click OK. The bitmap is displayed. You is able to size the bitmap by clicking and dragging on the graphic.



Note Custom Bitmaps must first be added to your project directory. Insert the bitmap in the directory used to store all graphic and symbol files. Most configurations store the graphics in the FMProject\Graphics subdirectory.

Editing objects

Editing objects involves moving, copying, and deleting selected objects as well as modifying the attributes of the selected object. These attributes include color, style, fill, pen, and condition. An additional modifiable attribute is the database point variable selection. Conditions and Symbols can also be edited or deleted. Most of the editing options are found under the Edit menu. This section describes the different techniques used to edit a graphic.

Selecting an object

To move an object or change the object attributes, you must select the object with the Hand tool.

1. Click the Hand selector icon from the Draw toolbar.
2. Select the object.
3. An object selection can be cancelled after the object has been selected – Click anywhere on an empty spot in the screen (the handles disappear) or press ESC.
4. Choose an command from the Edit menu to modify the object.

Deleting an object

You can delete objects by selecting the Delete command in the Edit menu or by pressing SHIFT+DEL.

Next & previous

The Next and Previous commands allow you to change the selected object based on its layered position i.e. selecting overlapped objects.

- Next (PgUp) allows you to select an object from the back (or bottom) to the front (or top).
- Previous (PgDn) allows you to select an object from the front (or top) of the layers to the back (or bottom).

Attributes

All objects found under the Add menu item can be edited using the same initial procedure.

1. Select the object.
2. Select Attributes from the Edit menu item (or press Ctrl+A). The window pertaining to the selected object appears. This window is the same one that appears when first creating the object.
3. Make the desired changes and click OK when you have finished.
4. Your changes will then be displayed on the screen.

Push to back & pull to front

Use the Push to Back and Pull to Front commands to change an object's relation to another in your display. If one object appears in front (or on top) of another on the screen, you can modify that arrangement so the objects "switch places" in relation to each other.

If you wanted to "push" an object from the front (or on top) to the back (or behind) another object, choose the Push to Back command from the Edit menu, or press Ctrl+P. The Pull to Front (Ctrl+F) command works in the opposite direction.

Copying single objects

The Copy command allows you to duplicate objects on the screen.

1. Select the object and then select Copy from the Edit menu (or press Ctrl+C).
2. Click on the copied object and drag the cursor to another area of the display screen. When you hold down the mouse button, the cursor becomes a four-sided arrow. This indicates that you can move the object in any direction. When you release the mouse button, a copy of the object appears at the location to where you dragged the cursor.

Moving, deleting, and copying multiple objects

The Window option enables you to select and edit multiple objects. This option creates an "edit window" by drawing a square marquee around a group of objects. This window allows you to edit (move, copy or delete) all the objects in the window as a single unit. Selecting the Move and Copy Window options can perform two of these actions.

1. Select Window from the Edit menu item (or press Ctrl+W). A check mark appears beside the option.
2. Select the first corner of the window and drag the cursor around the group of objects you want to edit.
3. To change the size of the window, move the cursor to the border of the window. Note that the cursor becomes a two-headed arrow. Drag the arrow to make the window the desired size. Release the mouse button.
4. To move the window without moving its contents, click anywhere on the window. The cursor will become a four-headed arrow and you can drag the window to any desired location on the display.
5. Select the Edit menu and click Move Window (Alt+M), Copy Window (Alt+C), or Delete (Shift+Del).
6. If the Move Window option was chosen, move the window to a new location.
7. If the Copy Window option was chosen, move the duplicated window to a new location.
8. Select Window from the Edit menu item to disable the Multiple Select option.

Undo last

If you want to undo the last action performed, click Undo Last from the Edit menu item.

Redrawing the screen

During the editing process, extraneous pixels may remain on the screen. Redraw removes those pixels and gives you a "clean" display screen (all objects are redrawn).

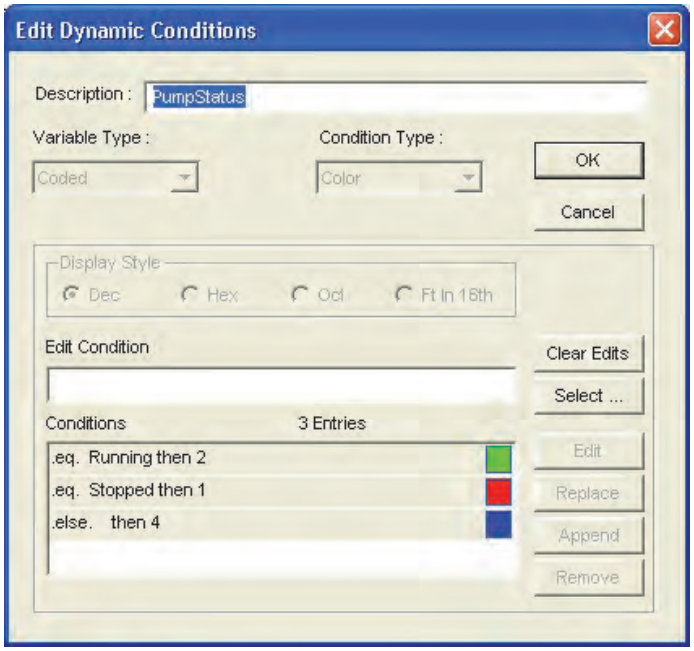
Resizing objects

A selected object is marked by small squares called handles. Lines have three handles one at each end and one at the center. Labels and Values have one handle. The Label handle is located on the upper border of the label, on the left, center or right, depending upon the label's text alignment.

A Value's handle is always located on the left. Arc handles include the arc start and end points, as well as handles at the corners and sides of the rectangle bordering the original ellipse drawn to create the arc. All other objects are marked with handles at the corners and sides of the object's bordering rectangle.

The geometric shapes can be sized by grabbing these handles. When resizing symbols, the symbols remain in proportion.

Using Dynamic Conditions



You can use Draw's Dynamic Conditions to change the way an object in a graphic appears based on real-time changes in the system, including site events, alarms, and other activity.

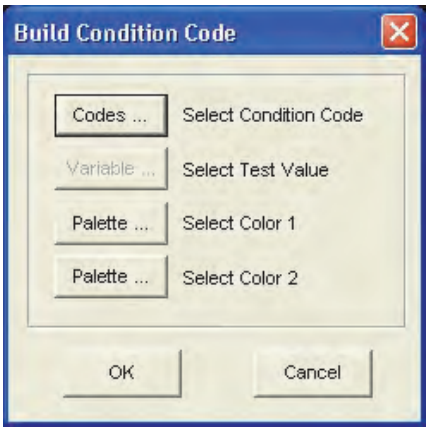
You can build conditions to show specific alarm conditions for database points. This provides more detailed information to the operator than simply showing whether a an alarm state exists.

Creating a Dynamic Condition

To create a condition, you associate it with a database point and variable, determine what visual change will take place (change color or change visibility), and set up the detailed instructions for the condition. You can add up to 20 separate condition statements for a single condition.

When you save the condition, it is placed in the Condition Index and is available to assign to graphic objects as described on page 174.

1. Select Condition Index from the Master menu to open the Select Global Dynamic Conditions dialog.
2. Click New to open the Edit Dynamic Conditions dialog.
3. Type a Description for the first condition.
4. Select the Variable Type.
5. Select the Condition Type.
6. The Display Styles availability are dependent on the Variable Type selected.
7. Click the Select button to open the Build Condition Code dialog. The available Code types is based on the Variable Type selected earlier.



8. To select the Condition Code, click the Codes button and select from the list.
9. To select a Test Value, click the Variable button and select it from the list.
10. To select a color for the condition, click the Palette button next to Color 1 and select the color you want to represent the condition. If you want the object to blink, repeat this step with Select Color 2.
11. Click OK to return to the Edit Dynamic Conditions window.
12. Click Append to add your selections to the Conditions list.
13. Continue appending conditions until your Dynamic Condition is complete.
14. On the Edit Dynamic Conditions window, click OK.

Assigning a condition

You can assign the a condition to any object in a graphic to make that object change visually based on changes in the FuelsManager database. Common reasons for assigning a condition are to show a change in status for an input point or to show an alarm condition for an input point.

The process for creating a condition is described in detail on page 173.

1. Open the graphic or template graphic in which you want to apply the condition.
2. Select the object or symbol that you want to assign the dynamic condition to.
3. From the Edit menu, select Conditions to open the Define Object Conditional Data dialog, or press <Ctrl+K>. A window appears for selecting the database point variable reference for the condition.

   If you are working with a regular graphic, go to step 4. If you are working with a Template Graphic, go to step 5.

4. If you are building a regular graphic, use the Database Edit window to select a database reference as follows:
   a. If you need to select a different database, click the Database button.
   b. Under Point Name, navigate to the correct tank point by selecting an entry and using the Next Level or Prev Level buttons.
   c. Click the Select button. The Select Database Point Variable window appears showing your point selection.
   d. If the Variable selection shown is not correct, click the Variable button and choose a variable in the Select Point Variable window, then click the Select button.
   e. If any settings are incorrect, click the appropriate button(s) to correct the settings.
   f. Click the OK button. The Define Object Conditional Data window appears.

5. If you are building a template graphic, use the Template Configuration Dialog window to select the database reference as follows:

   a. Select the database reference for the object by using one of these methods:
   Click the Browse button and select a database point, then click the OK button. The Tag Name, Point Type, Variable, and Format fields display your selection.

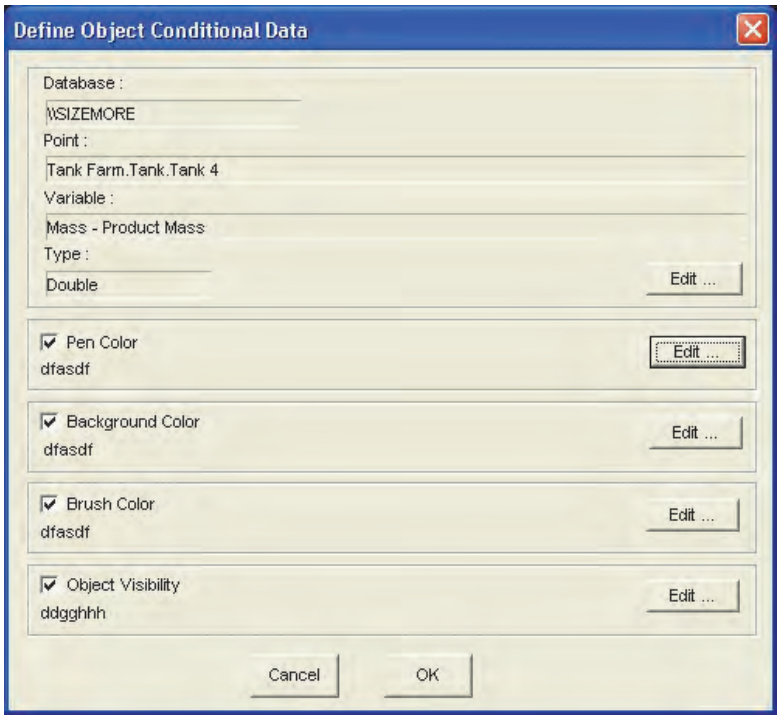
   Alternatively, use the Tag Name, Point Type, Variable, and Format fields and buttons to manually define the point. This may be necessary if your system does not have access to the appropriate site database, or if the database has not been created.

   b. To display quality codes with the data in Operate, select Display Quality Data.

   c. To make this an absolute reference, select Absolute Point Path. When you select this option, the value will always point to selected database point and value.

   d. If any settings are incorrect, click the appropriate button(s) to correct the settings.

   e. Click the OK button. The Define Object Conditional Data window appears.



6. Select the checkbox for the visual change that you want to apply to the object when the condition requirements are met. Text Color or Pen Color, Background Color, Brush Color, or Object Visibility. Option availability depends on the object you selected in step 2.

7. Choose a condition by doing the following:

   a. Click the Edit button next to the visual setting option you selected. The Select Global Conditions window appears listing the available predefined conditions.

   b. If the condition that you need is not in the list, you can click the New button to create a new condition as described on page 173.

   c. If you need to modify a condition before applying it, select the condition and click the Edit button. Refer to page 176 for detailed instructions.

   d. Select a condition.

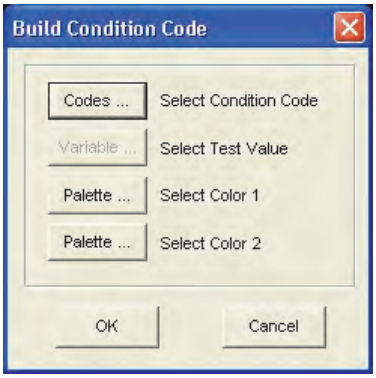
   e. Click the OK button.

8. In the Define Object Conditional Data window, click the OK button to apply the condition to the object.

Editing a Dynamic Condition

You can edit a condition to change how it appears to operators, change the database point variable it is associated with, or to modify any other aspect of the condition.

1. If the Select Global Dynamic Conditions window is not open, open it clicking on the Master menu and selecting Condition Index.
2. Select the condition that you want to edit.
3. Click the Edit button. The Edit Dynamic Conditions window opens.
4. Change the Description if appropriate. This is the name that appears in the Condition Index list.
5. Change the Variable Type, and/or Condition Type if appropriate. These may not be available if you are in the process of assigning the condition to an object.
6. If appropriate and available, change the Display Styles. The availability of this option is dependent on the Variable Type selected.
7. To change the condition codes, do the following:
   a. Click the Select button to open the Build Condition Code dialog. The available Code types is based on the Variable Type selected earlier.



   b. To change the Condition Code, click the Codes button and select from the list.
   c. To select a Test Value, click the Variable button and select it from the list.
   d. To select a color for the condition, click the Palette button next to Color 1 and select the color you want to represent the condition. If you want the object to blink, repeat this step with Select Color 2.
   e. Click OK to return to the Edit Dynamic Conditions window.
   f. Click Append to add your selections to the Conditions list.
   g. Continue appending conditions until your Dynamic Condition is complete.
8. On the Edit Dynamic Conditions window, click OK.

Customizing Tank Detail screens

The Tank Detail not only displays tank point information, but also is used to perform tank transfers and tank calculations.

You have the option of using one of the defaults provided with your system, or creating one or more user-defined Tank Details. One of the FuelsManager default Tank Details is typically used as a template. You can rearrange the contents, delete sections, and create new values, labels, appends (buttons) and other objects. You can use any of Draw's drawing tools to redesign the Tank Detail.

Two common reasons for using custom Tank Detail screens are:

- To make the tank image reflect the actual tank type. You could apply a custom Tank Detail depicting a bullet tank for all bullet tanks, and a different Tank Detail for all cylindrical tanks.
- To build control buttons for specific gauge types installed on specific tanks.

The only difference between creating a Tank Detail and creating any other graphic is how the Value tool is used. See Editing a Value below for more details.

> Note Multiple Tank Detail templates can be created, you can define which template will be used on a tank-by-tank basis refer to the Configuring Database chapter.

Process overview

The process of creating a custom Tank Detail is summarized below:

1. The display is opened in Draw. Insert labels, values, and other objects.
2. Once completed, the display is saved and generated like any other graphic.
3. The default Tank Detail is then defined by entering the file name in the Registry Editor, as described in “Changing the Default Tank Detail Display” on page 43.
4. The default Tank Detail can be overridden on a tank-by-tank basis by entering the file name in the Detail field of the Edit Tank Data window.

Creating a custom tank detail

> Note DO NOT SAVE over the default file. Save the file under a different file name by selecting Save As.

1. Select File and click Detail Mode. If a graphic is presently opened, Draw will ask if you want to save the file. A check mark appears next to the Detail Mode menu option.
2. Select File and click Open. The Open Graphic File window appears.
3. Select the desired graphic (*.grf) from the File Name list box. Make sure that the Graphic option button is selected.
4. The Tank Detail graphic appears in the Draw window.

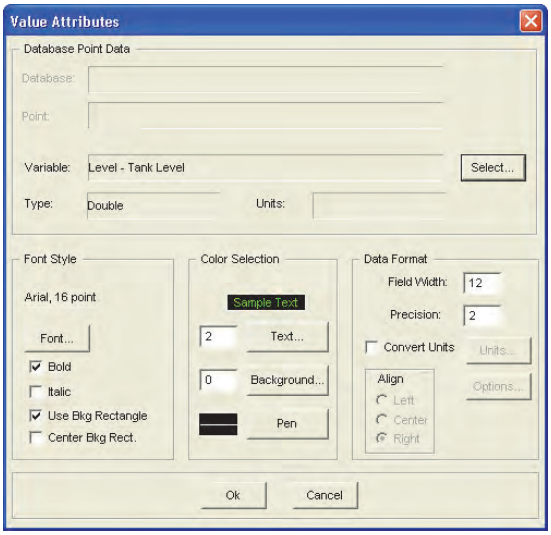
Editing a value

Tank Details can be edited in one of two modes, Use Parameter mode and Use Template mode. You can switch between these modes via the Draw menu, File sub-menu, Detail Data command.

Use parameters mode

In this mode only tank point variables can be added to the Tank Detail. This is the default mode.

1. From the File menu click Detail Data, from the sub-menu select the Use Parameters option.
2. Click on the Hand selector icon in the toolbar and then select the desired value.
3. Select Attributes from the Edit menu.
4. The Value Attributes window appears.
5. Click Select next to the Variable entry. The Select Point Variable window appears. The tank parameter can be selected in this window.
6. Choose the tank parameter and click Select.



Use template mode

In this mode you can select any input, output, or triggered point that is at the same database level as the tank point.

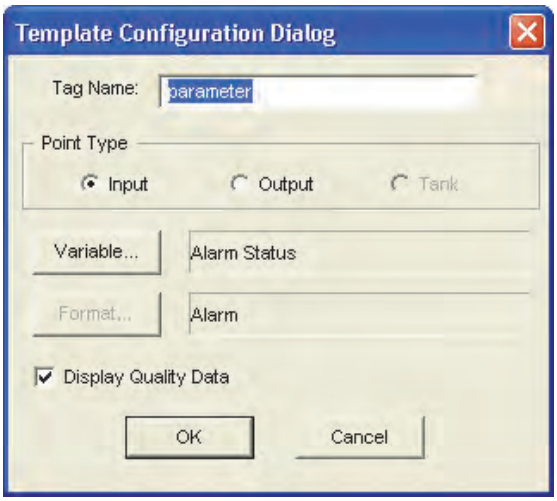
Such as, assuming a database structure of:

Area31.	Tank1.	TankPoint	(tankpoint)
Area31.	Tank1.	ValveStatus	(input)
Area31.	Tank1.	PumpStatus.	(input)
Area31.	Motor.	BearingTemp	(input)

The input points Area31.Tank1.ValveStatus and Area31.Tank1.PumpStatus can be added to a tank detail using the Use Template mode. The input point Area31.Motor.BearingTemp cannot be added to the tank detail.

> Note The Tag Name field in the Template Configuration window is case sensitive, you must enter the Level 0 tag name exactly as it appears in the database.

1. From the File menu, click Detail Data, from the sub-menu select the Use Template option.
2. Click on the Hand selector icon in the toolbar and then select the desired value.
3. Select the Attributes command from the Edit menu.
4. The Value Attributes window appears.
5. Click Select next to the Variable entry.
6. The Template Configuration window appears.
7. In the Tag Name edit box, enter the Level 0 database name Input or Output point as it appears in the system database. In our previous example, you would enter Valve Status or Pump Status.
8. In addition to the Tag Name, select either the Input or Output point type, select which parameter should be displayed (i.e., Process Value, Engineering Units, etc.), and select the data format of the parameter.
9. Click OK.



Keyboard shortcuts for Draw tools

Keyboard Shortcut	Function
Shift+Del	Deletes the selected object.
Pg Dn	Moves the selection to an object that lies beneath the current object.
Pg Up	Moves the selection to an object that lies in front of the current object.
Ctrl+C	Creates a copy of the selected object and places the copy directly on top of the original.
Ctrl+A	Displays the Attributes window for the selected object.
Ctrl+K	Displays the Conditions window for the selected object.
Ctrl+P	Sends the selected object to the back of the drawing space. All objects that were behind the selected object will then be in front of it.
Ctrl+F	Brings the selected object to the front of the drawing space. All objects that were in front of the selected object will then be behind it.
Ctrl+W	Lets you select multiple objects that you can move or copy with the Move Window and Copy Window menu items.
Alt+M	Lets you move objects selected using the Window command (Ctrl+W).
Alt+C	Lets you copy.
F12	Displays the Draw online help system.

11 Configuring Leak Detection

Leak Detection is designed to monitor tank farms and pipelines for leak conditions and alert you to a potential environmental hazard.

> Note Leak Detection is an optional feature that is available with FuelsManager Standard or Professional Edition.

Using the Remote Terminal Unit, the Leak Detection system communicates with various leak detection systems, such as interstitial monitoring, vapor monitoring and pipeline leak detection systems, while bringing all information back to one central computer for monitoring and reporting ease and convenience.

- Monitoring Level, Temperature, Water Level and Density from field instruments or operator entry.
- Performing analysis of sensor data, looking for conditions that might indicate a leak.
- Comparing instruments readings and calculations against alarm limits.
- Annunciating, processing and logging alarms.
- Providing Reports.

Configuration of the FuelsManager Leak Detection feature is performed from the Configuration user interface and is documented in this section. The procedure for running a leak test and creating a leak report is accessed using the Operator user interface and is documented in the User Guide for the Operate program.

Leak Detection interfaces directly to FuelsManager's Archive database, reading data from ArchiveManager's database file, applying filtering algorithms, calculating various statistics, applying qualifying logic and writing the results of the calculations to FuelsManager database points. Alarm Processes running within DataManager can monitor the resultant calculations. Any data source can serve as the source of data for Leak Detection's calculations. This includes data manually entered, data calculated by DataManager or an Application DLL, or data received via CommManager or an OPC server.

FuelsManager Leak Detection feature is able to detect a leak at rates as low as 0.2 gallons per hour. The ability to detect leaks at these rates depends upon the physical characteristics of the tank (size, shape, above/below ground, materials used in construction, etc.), the types of instruments available to measure the properties of the product in the tank, the resolution & stability of the instruments, and how the tank is used.

Leak Detection has two basic methods for detecting tank leaks: Volumetric and Mass.

Volumetric Analysis

Volumetric leak detection involves measuring the level and temperature, calculating the Net Standard Volume, analyzing the tank data during periods of inactivity, and searching for losses.

Detection of leaks in bulk storage tanks using volumetric changes depends upon a number of factors, including the dimensions of the tank, and the Net Standard Volume derived from the level & temperature.

The resolution, stability and accuracy of the level & temperature instruments play a major role on how effective this method is. An accurate gauge with high resolution yields the best results for static measurement. The accuracy of the tank strapping table will also affect the accuracy of the volume calculation. Errors in the strapping table could appear as leaks.

Some factors have more influence than others, depending upon the application. In large tanks (over 50,000 gallons), the resolution of the level measurement is the limiting factor. For example, for a 1,000,000-gallon cylindrical tank, 40 feet in height, a sixteenth of an inch (1/

16") equates to almost 150 gallons. This means that a long time period is needed to effectively detect a leak. Another limiting factor is the resolution and stability of the temperature sensor. Changes in both the product and the tank shell temperature will affect the volume of the product in the tank.

Currently, Leak Detection is approved with three different level probes for volumetric leak detection:

Manufacturer & Model	Volume	Leak Rate/Test Time
MTS DDA	0-75,000 gallons	.2 gal/hr; 24 hour test
L&J 8100	0-75,000 gallons	.2 gal/hr; 24 hour test
Barton Instruments	0-75,000 gallons	.2 gal/hr, 24 hour test

Mass Analysis

Mass based leak detection is based upon measuring the pressure of the product and applying the conservation of mass principle. In bulk storage tanks, the Total Observed Volume will fluctuate with changes in the temperature of the product. The mass of the product in the tank is a constant, so changes in the temperature of the product have no effect on the total mass in the tank.

Currently, Leak Detection is approved with one probe for mass-based leak detection:

Manufacturer	Volume	Leak Rate/Test Time
Barton Instruments	0-3,000,000 gallons	3.0 gal/hr; 48 hour test

Tank Analysis Types

The analysis type selected by the operator determines the method used to search for a leak. When configuring a tank, the following analysis types can be set:

- Static
- Continuous
- Real-Time

Static Analysis

Note A tank typically requires 24 hours to become stable for adequate Static analysis.

A Static analysis type requires the tank to be shut down (out-of-service) and stable for 24-48 hours, depending on the gauge type. Typically, a total of 24 hours of valid data or quite time is needed to perform a relevant static tank analysis. After analyzing valid data from ArchiveManger over a minimum 24 hour time period, the system can report valid leak rates.

Continuous Analysis

Continuous analysis allows the operator to keep the tank in use while performing an analysis. The system automatically identifies valid down times from ArchiveManager during regular operation and builds the results. Continuous analysis does analyze tanks in real-time, like Static Analysis, Continuous Analysis are manual operations initiated by the operator.

Real-Time Analysis

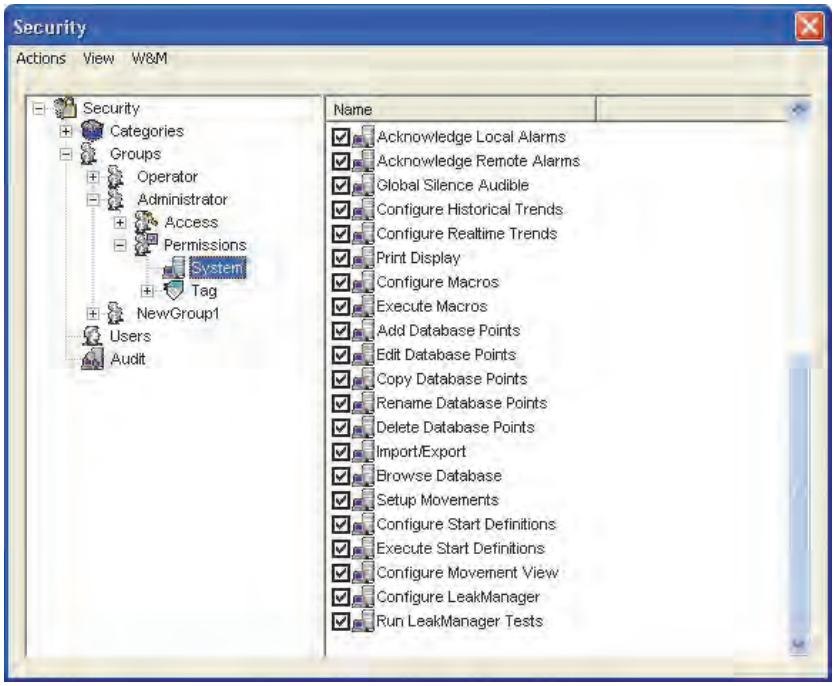
Real-Time analysis allows for an automatic continuous analysis of tanks. An operator will not have to interact with the Leak Detection system to perform an analysis. Unlike Static and Continuous types, Real-Time Analysis works constantly to analyze the leak rate. Tests are performed automatically every day at 12:00 am. Leak Detection can, if configured, trigger an alarm if the analysis detects a leak that is out of range. Also, an alarm is triggered if Leak Detection detects that there is not enough quiet time data in the current month, from the tank to produce a valid Leak Test Report.

Security

For Leak Detection to be accessible, the following permissions must be granted:

- Configure Leak Detection allows users to configure leak tests for tank points.
- Run LeakManager Test allows operators to execute leak tests.

Note For more detailed instructions on Security, please refer to the FuelsManager Security section of this manual.



ArchiveManager

The ArchiveManager database is analyzed to calculate leak rates. It is necessary to configure ArchiveManager to write all required data to the archive database:

- ArchiveManager needs to be configured to include the following additional tank point variables:

Cathodic Protection	Standard Density
Date Installed	Tank Gauge Type
Density	Tank Height
Hydro Pressure Units	Tank Level
Hydro Pressure Volume	Tank Material
Bottom Pressure P1	Tank Radius
Leak Rate	Tank Volume
Leak Rate Units	Temperature
Lining Material	Unrounded Volume Net
Overfill Protection	Water Level
Spill Protection	

In addition, the following ArchiveManager Configuration changes must be made:

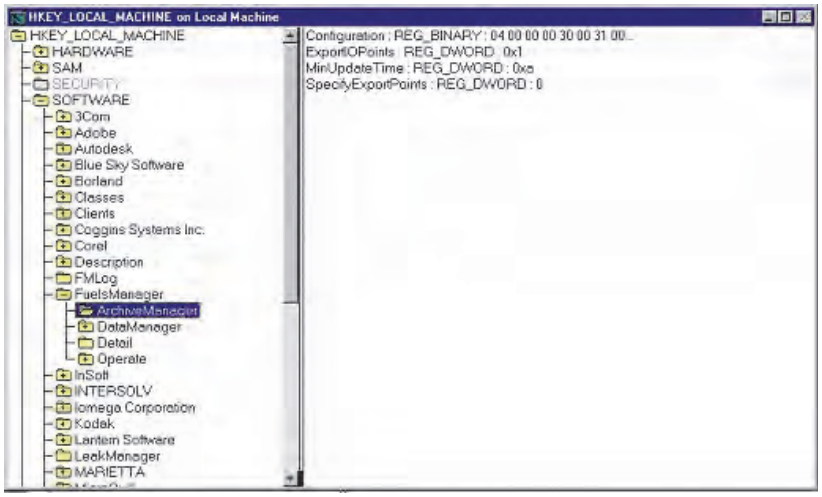
- The precision of the Tank Level should be increased to allow Leak Detection to calculate small volume changes.
- ArchiveManager's sample Interval should be set to 5 minutes.
- ArchiveManager's Historical Period should be set to 60 or 90 days.

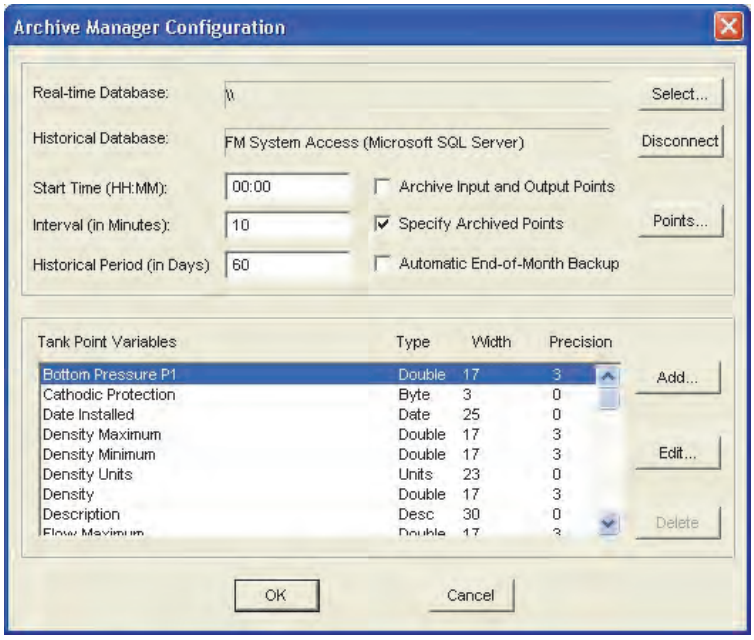
For details on how to add the necessary additional tank point variables, and configure the precision and historical period, see the Archiving information section of this manual.

The following section details how to override the ArchiveManager minimum sample interval of 10 minutes and set the sample interval to 5 minutes.

To set the default minimum to 5 minutes

1. Click the Windows Start button and select Run. The Run window appears.
2. Type regedt32. The Registry Editor appears.
3. Select HKEY_LOCAL_MACHINE, the FuelsManager key, and the ArchiveManager subkey.
4. Double-click the MinUpdateTime value, set the value to 5 and click OK.
5. Close the Registry Editor.

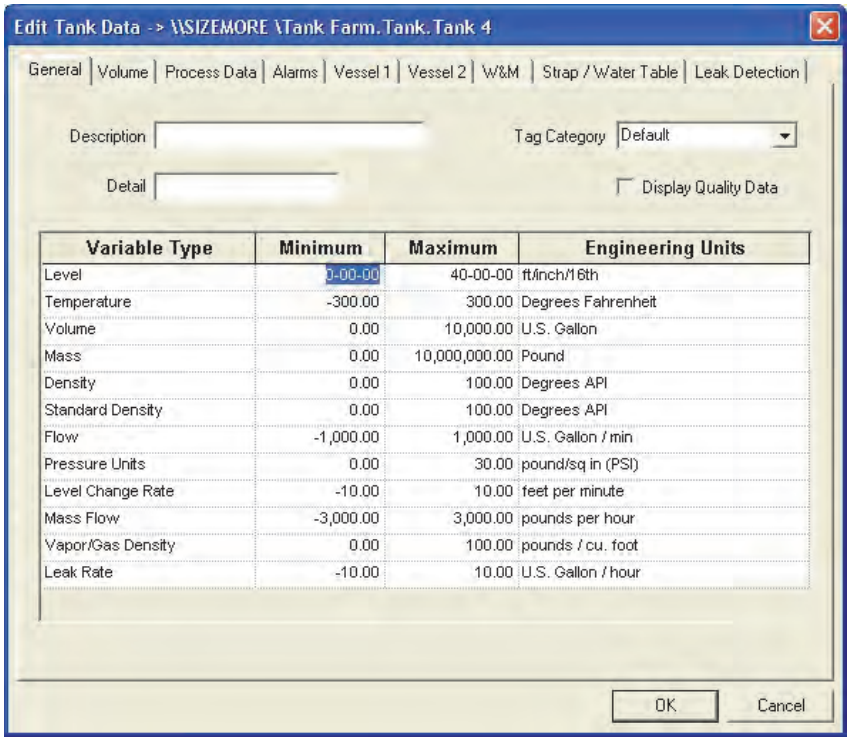




1. From the FuelsManager Configuration application, click the Database menu and click ArchiveManager. The Archive Manager Configuration window appears.
2. Change the Interval entry to 5 and click OK. The system closes the Archive Manager Configuration window and updates ArchiveManager with the new settings.

Edit Tank Data

All leak relevant data must be configured in the Edit Tank Point Data dialog for each tank when a leak analysis is performed. The minimum leak rate value, maximum leak rate value and leak rate units for the tank are configured on the General page of the dialog.

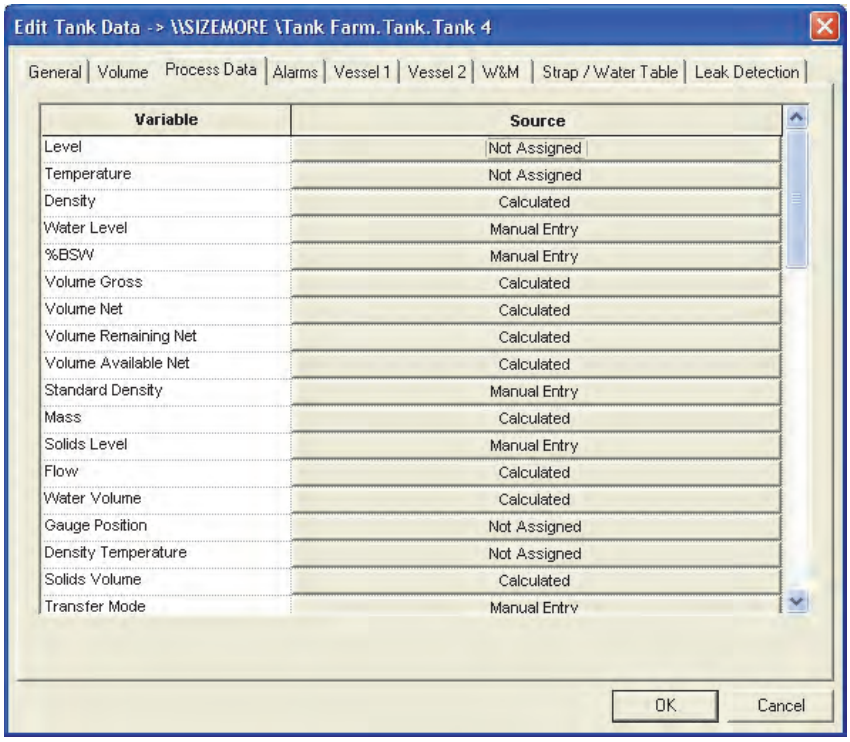


Note The fields described in this section for the Edit Tank Data dialog only apply to those related to Leak Detection. For descriptions of other fields on the Edit Tank Data dialog, refer to the Databases section of this manual.

Leak Detection	Variables Assignment Options
Leak Rate	Minimum values, Maximum values and Engineering Units

Process Data

The Leak Rate value can be set to a communication source assignment, an OPC Data Source can be calculated from ArchiveManager data.

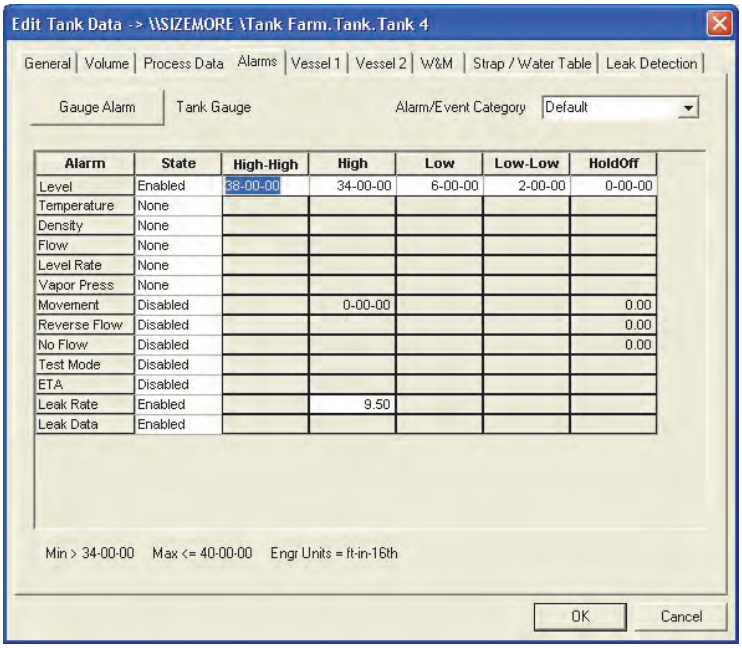


LeakManager Variables	Assignment Options
Leak Rate	Calculated, Manual Entry, Communication Device and OPC

Alarms

The leak rate alarm is used to trigger real-time alarms associated with calculated real-time leak rate. The leak data alarm is used to trigger a real-time alarm when there is not enough quiet time in the tank to produce a valid Leak Test Report.

Note Leak Detection alarms are only functional for Real-Time leak analysis.



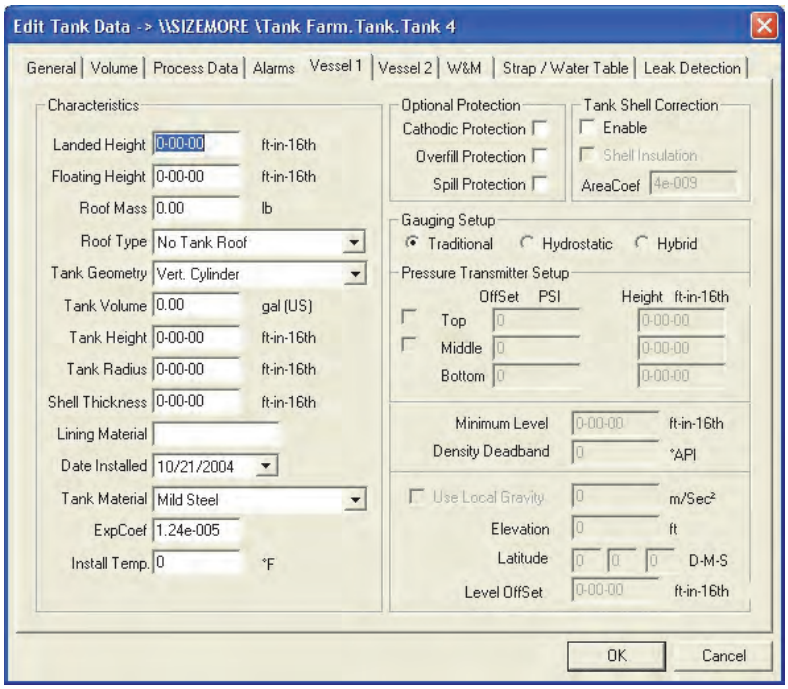
Alarms	Description
Leak Rate	Allows an Enable/Disable State and allows the entry of High absolute values. The Leak Rate alarm is triggered if the absolute values of the Leak Rate exceed the defined High absolute limits.
Leak Data	Allows an Enable/Disable State. This alarm, when enabled, will alert every day at 12:00 AM to notify the operator that there is not enough valid data or quiet time data from the configured tank to produce a valid Leak Test Report.

Vessel 1

The Vessel 1 page allows you to enter additional data about the tank, such as its construction material, inspection date and dimensional data. This data is not used in any calculations and is only presented as informational data on the Leak Test Report. The following fields on the Vessel 1 page are important for informational data:

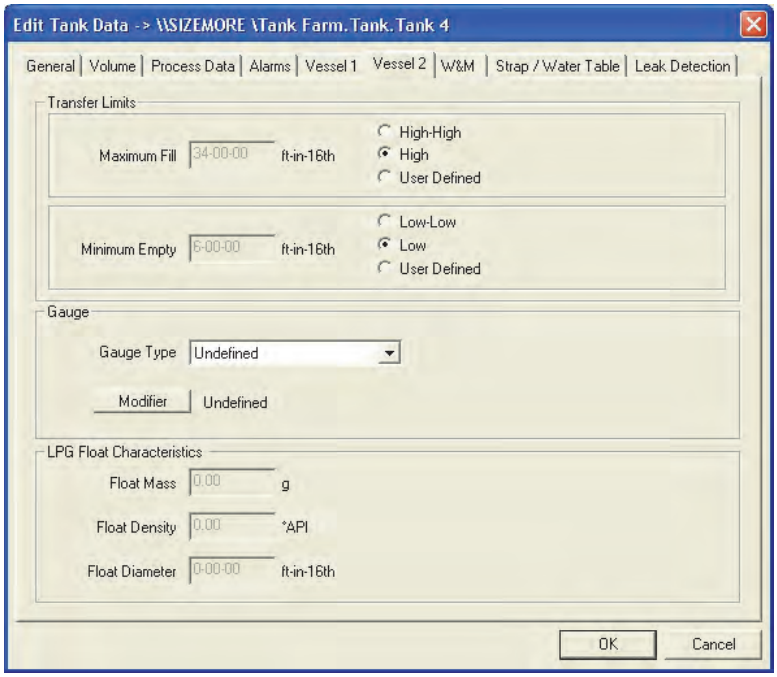
- Tank Volume
- Tank Height
- Tank Radius
- Tank Material
- Lining Material
- Date Installed
- Cathodic Protection
- Overfill Protection
- Spill Protection
-

Note Leak Detection data from the Vessel 1 page appears on the Leak Test Reports.



Vessel 2

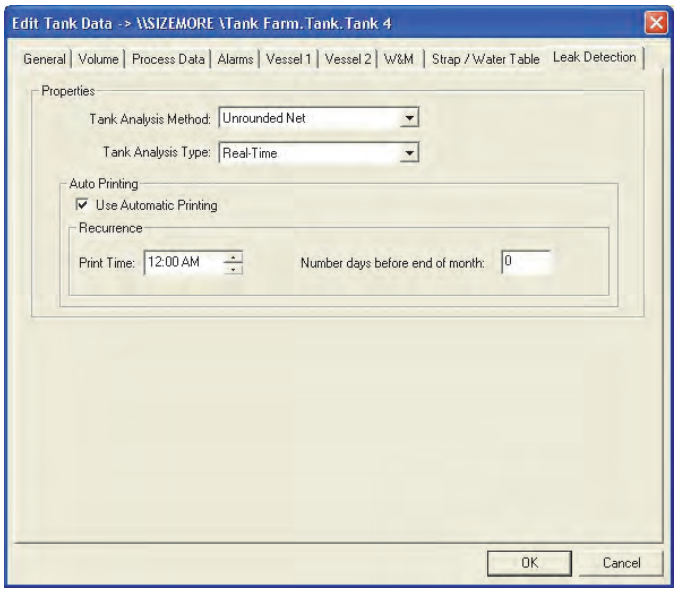
The type of gauge/probe used on the tank is configured from the Vessel 2 page. You have the option to chose from all current FuelsManager supported gauges from the Gauge Type drop-list.



Leak Detection page

Note The Leak Detection page will not appear if the Leak Detection feature is not installed or you do not have the Configure Leak Detection security permission.

The Leak Detection page allows you to configure Real-Time analysis on configured tanks. Also, automatic printing of a Real-Time Leak Test Report at the defined print time and day before end of the month can be configured.



Field	Description
Tank Analysis Method	Drop-list of leak analysis methods that are valid for the tank gauge selected from the Vessel 2 page. The methods include: Net Volume, Unrounded Net Volume, and Barton Series.
Tank Analysis Type	This field is typically for real-time tank analysis. The types supported include Static, Continuous, and Real-Time.
Use Automatic Printing	Allows you to enable and disable automatic printing. This field is only functional if Real-Time is the current selection in the Tank Analysis Type drop-list.
Print Time	Allows the selection for the time of day the Real-Time Leak Test Report will be printed. This field is only functional if Use Automatic Printing is selected.
Number of days before end-of-month	Allows the setting of the printing interval for the Real-Time Leak Test Report in relation to the last day of the month. This field is only functional if Use Automatic Printing is selected.

Tank Analysis Methods

There are three possible tank analysis methods that can be used in FuelsManager. All three methods compare test readings at different times to calculate leak analyses.

Tank Analysis Method	Description
Net Volume	The Net Volume method collects net volume readings from the tank when performing tests. This method uses up to four decimal places in its VCF calculations, which is an API standard.
Unrounded Net Volume	The Unrounded Net Volume method collects net volume readings from the tank when performing tests. This method uses up to 15 decimal places in its VCF calculations, which provides a more accurate reading.
Barton Series	The Barton Series method collects pressure readings from the tank when performing tests. FuelsManager retrieves the pressure from a device that must be mapped to the Vapor Press P3 process variable.

Note For more information on Process Variables, see the Database and Glossary sections of this manual.

12 Configuring Automated Data Output

In this section, you will learn how to configure, maintain, and operate the Automated Data Output section. This feature is used to periodically write the contents of several tank point variables to an output file.

> Note Automated Data Output is an optional feature that is available with FuelsManager Standard or Professional Edition.

Automated Data Output basic functions include:

- Reading specified variables, up to a total of 98, from all tank points in the FuelsManager database at specified intervals, or when a specific Process Value is triggered.
- Writing these values to output CSV, HTML, and XML files.

Program Location

The Automated Data Output service starts automatically whenever Windows is started; however, it can be configured at any time from the Start, Programs, FuelsManager, Automated Data Output.

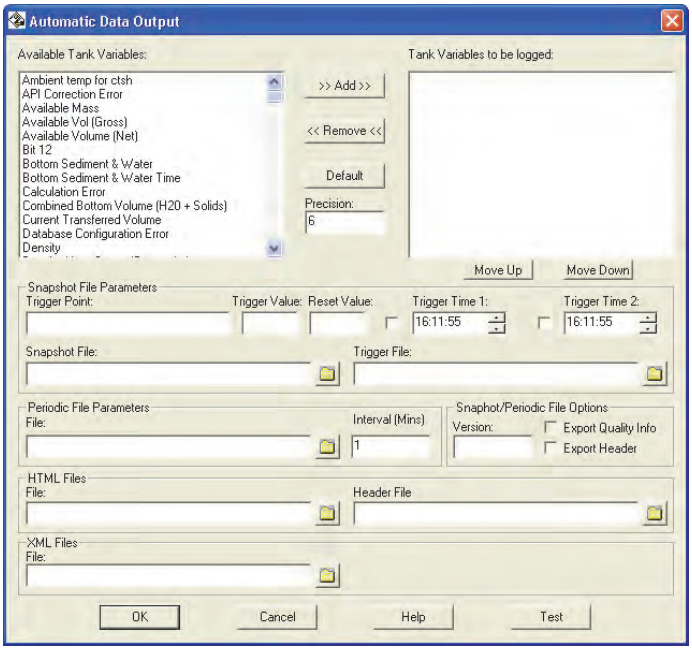
The configuration process includes specifying which tank point variables should be logged, and what events initiate the log process. Up to 98 tank point variables can be logged simultaneously, though usually substantially fewer are needed. Also, there are three different types of "triggers" that can be defined to initiate the log process.

Output File Types

Output File	Description
Snapshot file	A Snapshot file is a CSV file, written when a particular point value takes place, and is designed as a "snapshot" of the data at the moment in time at which the trigger was tripped. This file can be written whenever a specific FuelsManager database value is met, whenever a specific file exists, or at two individual static trigger times. • Trigger Point: A trigger point and a trigger value can be entered. Automated Data Output will wait for that specific database point value to equal the trigger value and will then write the snapshot file. • Trigger Time 1/2: Two trigger times can be specified directly. These times indicate exactly when the snapshot file should be written. This option is very useful for things like daily inventory reports or statements. • Trigger File: This option triggers a snapshot file whenever a specific file is detected. The file is then deleted as soon as the operation is complete, to reset the trigger.
Periodic File	The Periodic file is a CSV file, written at regular intervals, as specified in the Periodic Interval field. There is a check-box option to export the column headers with the data, as well as an option to include a custom "Version" column.
HTML File	The HTML file is a hypertext markup language (HTML) file, and it is written periodically, according to the Periodic Interval field. There is an option to include another HTML file as a header, so that company logos, etc., can be included on the output. This option can be used to publish data directly to a local or web server on a periodic basis.
XML File	The XML file is an extensible Markup Language (XML) file, and it is written periodically, according to the Periodic Interval field. It can be used alongside or instead of the HTML file.

Table 12-1: Output File Types

Automated Data Output Configuration Dialog



Note If a tank point variable is not configured (see the Database section of this manual), the resulting data written by Automated Data Output may be invalid.

Field	Definition
Available Tank Variables	This list includes all possible tank point variables.
Tank Variables to be logged	This field lists all of the tank point variables that are currently selected to be logged.
>> Add >>	This button adds the currently selected variable in the “Available Tank Variables” list box, on the left, to the “Tank Variables to be logged” list box, on the right. That variable will then be removed from the “Available Tank Variables” list box.
<< Remove <<	This button removes the currently selected variable from the “Tank Variables to be logged” list box, on the right. That variable will then reappear in the “Available Tank Variables” list box, on the left.

Field	Definition
Default	This button deletes all variables from the "Tank Variables to be logged" list box, and then adds the Automated Data Output default set of variables to that list box. This default list is generally accepted as the most commonly used set of variables, and includes the following: • System Name • Point Tag • System Date and Time • Product Code • Level • Temperature • Standard Density • Gross Volume • Net Standard Volume • Available Volume (Net) • Remaining Volume (Net) • Flow Rate
Precision	The precision of the data in the output files can be entered here. The Precision field defines the number of decimal places you want in the values logged. If you enter 0, no decimal places will be logged.
Trigger Point, Trigger Value	A FuelsManager point can be entered and you can set the trigger value. The Trigger Point that you use must be an Input point, and must be set to a Manual Data Source. When the trigger point equals the trigger value, Automated Data Output will write the snapshot file. This method can be used to manually initiate the log process when needed, or to cause the log process to initiate automatically whenever a particular event takes place.
Reset Value	After the Trigger Value is reached and a snapshot file is created, Automated Data Output sets the Trigger Point value to the Reset Value.
Trigger Time 1, Trigger Time 2	Two distinct trigger times can set so that the log process runs once or twice every 24 hours. To set a trigger time, check the box to the left of the time field you want to set, and then enter the trigger time into the appropriate field.
Trigger File	This field specifies an optional trigger on the existence of a specific file. If a file (with the full path to the file) is specified, then the log process is initiated whenever the existence of this file is detected. This file is subsequently deleted, to reset the trigger. The button next to this field opens a browse window to make it easier to specify the trigger file.
Snapshot File	A Snapshot file is an CSV file, written when any of the above Trigger events take place, and is designed as a "snapshot" of the data at the moment in time at which the trigger was tripped. This file can be used to create a daily inventory report at a specific time, or to log the state of all tanks when a particular event or disk file is detected. The button next to this field opens a browse window to make it easier to define the desired output file.

Field	Definition
Periodic File	The Periodic file is an CSV file, written at regular intervals, as specified in the Periodic Interval field. There are options to export the column headers with the data, as well as an option to include a custom “Version” column.
Periodic Interval	The Periodic Interval is the amount of time, in minutes, between updates to the Periodic File. The Periodic File is overwritten each time this period expires, and the counter begins when Automated Data Output starts, which corresponds with when Windows starts.
Version	If a value is specified in the Version field, it is included in the periodic file as an additional column of data. This affects both the Snapshot File Parameters and the Periodic File Parameters.
Export Quality Info	If this box is checked, the file will contain the current status of the selected variables (overrage, underrage, forced, manual, etc.). This affects both the Snapshot File Parameters and the Periodic File Parameters.
Export Header	If this box is checked, then the field names are included at the top of each column of the CSV file. If this file is not checked, then the data is written without a header. This affects both the Snapshot File Parameters and the Periodic File Parameters.
HTML File	The HTML file is a hypertext (HTML) file, and it is also written periodically, according to the Periodic Interval field. This option can be used to publish data directly to a local or web server on a periodic basis.
HTML Header File	This field is used to specify another HTML file as a header for the output HTML file. This option can be used to include company logos or other information at the top of the web page.
OK	Clicking on this button saves any changes that have been made and closes the Automated Data Output configuration dialog.
Cancel	Clicking on this button discards any changes that have been made and closes the Automated Data Output configuration dialog.
Test	Clicking this button causes all specified output files to be written immediately. This is very useful for verifying tank variables, header files, and other options before saving the configuration data.

Configuring Automated Data Output

This section describes how to configure Automated Data Output to export the desired variables to the proper output files.

Initial Setup

Refer to the Dialog Descriptions section for field explanations on the configuration window used in this procedure.

1. Start the configuration program by selecting Start, Programs, Automated Data Output, Automated Data Output.
2. Select the variables to be logged from the Available Tank Variables field and click the >> Add >> button. You can select all the variables to be logged at once and add them simultaneously, or add them one-at-a-time.
3. Alternatively, you can click the Default button and add to or remove from the default set of tank variables. Keep in mind that the order in which the variables are displayed in the Tank Variables to be logged field is also the order in which the variables will be written to the output file.
4. If you want to use a database point value to trigger the file creation, define that point in the Trigger Point and Trigger Value fields. Then enter the Reset Value to the value you want to reset the point to after the snapshot file is created.
5. If you want to create snapshot files at specific times of day, check the box(es) next to the appropriate Trigger Time fields and enter your time(s) there. Keep in mind these fields are entered using 24-hour time. You can enter up to two Trigger Times.
6. Specify the snapshot file that you want Automated Data Output to write to by entering in the full path and file name into the Snapshot File field.
7. If you want to create a snapshot file using a trigger file (when a file exists), enter that file's path and filename in the Trigger File field.
8. If you want Automated Data Output to create a Periodic File, enter the path and filename you want to create in the Periodic File field. Set the Periodic Interval field, keeping in mind that this value is also used to set the interval for the HTML file. Also set any desired Period File Options.
9. If you want Automated Data Output to create an HTML file, enter the full path and filename in the HTML File field, as well as an HTML Header File if you want to include a logo in the browser above your HTML file.
10. If you want Automated Data Output to create an XML file, enter the full path and filename of the file you want to create in the XML Files.
11. If needed, click the Test button and review the output files.
12. Click the Ok button to save the configuration and close the dialog. Automated Data Output configuration is now complete. Since Automated Data Output is running as a Windows service, the files 'Snapshot.csv', 'Test.csv', and 'Test.html' will be automatically produced as a specified, regardless of whether the Automated Data Output Configuration application is open.

13 Setting Calculation Methods

Volume correction methods

This section describes the correction methods and tank calculations used in the FuelsManager program. Since the volume of the product in a tank varies with the temperature and density, you must use a correction method to correct for variations in temperature and density of the product.

Data rounding

Selecting any of the correction methods designated 'Japan' allows you to configure the following special data rounding methods.

Volume Correction Factor (VCF)

- None
- 0.00001
- 0.0000001

Level

This includes both Product and Water Level

- None
- Nearest Integer (i.e. 123.5 millimeters is truncated to 123 millimeters.)

Temperature

This includes Product and Gas Temperature

- None
- 0.25 Degrees
  - 0.000 ~0.124 --- 0.00 °C
  - 0.125 ~0.374 --- 0.25 °C
  - 0.375 ~0.624 --- 0.50 °C
  - 0.625 ~0.874 --- 0.75 °C
  - 0.875 ~1.124 --- 1.00 °C
- 0.5 Degrees
  - 0.00 ~0.29 -- 0.0 °C
  - 0.30 ~0.79 -- 0.5 °C
  - 0.80 ~1.29 --1.0 °C

Volume correction techniques

Custody transfers and billing are used based on volumes at a given temperature, or Standard Temperature. FuelsManager provides the following temperature correction techniques. All correction techniques are based on internationally recognized standards developed by the American Petroleum Institute (API), American Society for Testing and Materials (ASTM), Institute of Petroleum (IP), Japanese Institute of Standards (JIS), Gosstandart of Russia (GOST), and Chinese National Standards (GB/T).

The goal of a correction technique is to calculate a Volume Correction factor (VCF) and to use this factor to calculate standard volumes from measured volumes. The VCF is defined as:

- Correction for temperature for a liquid
- Compensates for the effect of temperatures on a liquid
- Corrects a volume at an observed temperature to a standard temperature

Petroleum tables

Type	Method	Product	Table Entry	Range	Temp Range
API °F API °F 1980	6A/5A	Generalized Crude Oil	API gravity @ 60°F in API	0-40 40.1-50.0 50.1-100.0	0-300°F 0-250°F 0-200°F
	6B/5B	Generalized Products	API gravity @ 60°F in API	0-40 40.1-50.0 50.1-85.0	0-300°F 0-250°F 0-200°F
	6C	Individual & Special Applications	API gravity @ 60°F in API	0-40 40.1-50.0 50.1-100.0	0-300°F 0-250°F 0-200°F
	6D	Generalized Lubricating Oils	API gravity @ 60°F in API	0-50 50.1-100.0	0-150°F 0-125°F

Type	Method	Product	Table Entry	Range	Temp Range
API °C API °C 1980 Japan JIS 2249 °C 1980	54A/53A	Generalized Crude Oil	Density @ 15°C in kg/m^3	610.5-778.5 779-824 824.5-1075	-18-95°C -18-125°C -18-150°C
	54B/53B	Generalized Products	Density @ 15°C in kg/m^3	610.5-778.5 779-824 824.5-1075	-18-90°C -18-125°C -18-150°C
	54C	Individual & Special Applications	Thermal Expansion Coefficient in Alpha x 10^6	489-918 919-945	-18-150°C -18-125°C
	54D	Generalized Lubricating Oils	Density @ 15°C in kg/m^3	800-824 824.1-1164	-18-125°C -18-150°C
	54A/53A 30°C	Generalized Crude Oil	Density @ 30°C in kg/m^3	610.5-778.5 779-824 824.5-1075	-18- 95°C -18-125°C -18-150°C
	54B/53B 30°C	Generalized Products	Density @ 30°C in kg/m^3	653-778.5 779-824 824.5-1075	-18- 95°C -18-125°C -18-150°C
	54C 30°C	Individual & Special Applications	Thermal Expansion Coefficient in Alpha x 10^6	486-918 919-954	-18-150°C -18-125°C
	54D 30°C	Generalized Lubricating Oils	Density @ 30°C in kg/m^3	800-824 824.1-1164	-18-125°C -18-150°C
	60A	Generalized Crude Oil	Density @ 20°C in kg/m^3	610.5-778.5 779-82 824.5-1075	-18- 95°C -18-125°C -18-150°C
	60B	Generalized Products	Density @ 20°C in kg/m^3	653-778.5 779-824 824.1-1075	-18- 90°C -18-125°C -18-150°C
	60D	Generalized Lubricating Oils	Density @ 20°C in kg/m^3	800-824 824.1-1164	-18-125°C -18-150°C
Japan JIS 2256 °C 1967	Table 2(54)	Generalized Products	Density in g/cm^3	0.500-1.200	Not Specified
Japan ASTM D1250 °C	Table 55	Generalized Products	Density in g/cm^3	0.6274-1.0754	Not Specified
	54A (6X)	Generalized Crude Oil	Density in kg/m^3	610.5-778.5 779-824 824.5-1075	-18- 95°C -18-125°C -18-150°C
	54B (6X)	Generalized Products	Density in kg/m^3	653-778.5 779-824 824.5-1075	-18- 90°C -18-125°C -18-150°C
China GB/T	60A/59A	Generalized Crude Oil	Density @ 20°C in kg/m^3	653-778.5 779-824 824-1075	-18- 90°C -18-125°C -18-150°C
	60B/59B	Generalized Products	Density @ 20°C in kg/m^3	653-778.5 779-824 824-1075	-18- 90°C -18-125°C -18-150°C
	600/59D	Generalized Lubricating Oils	Density @ 20°C in kg/m^3	800-824 824.1-1164	-18- 90°C -18-150°C

Type	Method	Product	Table Entry	Range	Temp Range
Russia GOST	20°C-85	Oil & Oil Products	Density in g/cm^3	0-560-1.060	-25-114°C

Chemical tables

Correction Type	Table Entry	Product	VCF Range	Temp Range
ASTM D1555 °F ASTM D1555 °F 1980	VCF @ 60°F	300°F/148.9°C Aromatic	0.9741-1.0296	5-110°F
		350°F/176.7°C Aromatic	0.9756-1.0266	5-110°F
		Benzene	0.9597-1.0130	40-120°F
		Cumene	0.9670-1.0297	5-120°F
		Cyclo-hexane	0.9597-1.0132	40-120°F
		Ethyl-benzene	0.9660-1.0306	5-120°F
		Mixed Xylene	0.9671-1.0293	5-120°F
		o-Xylene	0.9683-1.0288	5-120°F
		p-Xylene	0.9496-1.0027	55-150°F
		Styrene	0.9675-1.0242	15-120°F
		Toluene	0.9647-1.0383	-5-120°F
ASTM D1555M °C ASTM D1555M °C 1980 Japan ASTM D1555 °C	VCF @ 15°C	300°F/148.9°C Aromatic	0.9729-1.0278	-15-44°C
		350°F/176.7°C Aromatic	0.9745-1.0262	-15-44°C
		Benzene	0.9583-1.0123	4.5-49.5°C
		Cumene	0.9660-1.0293	-15-49.5°C
		Cyclo-hexane	0.9585-1.0126	4.5-49.5°C
		Ethyl-benzene	0.9646-1.0300	-15-49.5°C
		Mixed Xylene	0.9661-1.0289	-15-49.5°C
		o-Xylene	0.9673-1.0285	-15-49.5°C
		p-Xylene	0.9492-1.0025	12-65.5°C
		Styrene	0.9664-1.0237	-9.5-49.5°C
		Toluene	0.9634-1.0376	-20.5-49.5°C
Japan Chemical °C		Chemical Applications	Thermal Expansion Coefficient in Alpha x 106	Not Specified
		Chemical Applications	Thermal Expansion Coefficient in Alpha x 106	Not Specified

Liquid Hydrocarbon Gas Table

Type	Method	Product	Table Entry	Range	Temp Range
API°F API°F 1980	24E/23E	Light Hydrocarbon	Density @ 60°F in Specific Gravity	0.350-0.688	-50-200°F
LPG°C LPG°C 1980	LPG	Liquid Petroleum Gases	Density @ 15°C in kg/m3	Not Specified	-110.0- 60°C

Asphalt Tables

Type	Method	Product	Table Entry	Range	Temp Range
Asphalt	ASTM D4311-04 °C	Asphalt	Density @ 15°C in kg/m3	850- Unspecified	-25- 275°C
	ASTM D4311-04 °F	Asphalt	Density @ 60°F in API	0- 34.9	0- 500°F
	ASTM-IP Table 7	Asphalt	Density @ 60°F in API	0- 100	0- 500°F

Polynomial

This technique is used for specialized products that do not fall within one of the correction tables already identified. A table of density versus temperature data can be converted to a polynomial using the least square method of curve fitting. Using the least square method results in a set of polynomial coefficients. FuelsManager accommodates a fourth order polynomial to obtain a VCF.

The VCF polynomial equation is as follows:

VCF = K0 + K1 (Dtemp) + K2 (DTemp2) + K3 (DTemp3) + K4 (DTemp4)		
Where:		
VCF	=	Volume correction factor = % Std Density
StdTemp	=	Standard Temperature
DTemp	=	Current temperature - StdTemp
K0 - K4	=	Coefficients of polynomial

Traditional tank calculations

Traditional tank sensors return the level and temperature of the tank. From these two values plus the tank configuration, a series of calculations is performed by the FuelsManager.

Strap Table Volume (TOV)

The strap volume is obtained from the tank strapping table for the measured tank level. FuelsManager calculates the volume for a given level based on the tank shape as shown below.

Cylindrical tanks

Calculations
LevelRatio = (Level - LowLevel)/(HighLevel - LowLevel)
TOV = (LowVolume + ((HighVolume - LowVolume) x LevelRatio))

Where (conditions)
Level = Current Tank Liquid Level
LowLevel = Strapping point level in table immediately below Level
HighLevel = Strapping point level in table immediately above Level
LowVolume = Strapping point volume in table for LowLevel point
HighVolume = Strapping point Volume in table for HighLevel point

Horizontal tanks

Calculations
LevelRatio1 = [((Level-HighLevel) x (Level-HighestLevel))/
((LowLevel-HighLevel) x (LowLevel-HighestLevel))]
CalcVolume1 = (LowVolume x LevelRatio1)
LevelRatio2 = [((Level-LowLevel) x (Level-HighestLevel))/
((HighLevel-LowLevel) x (HighLevel-HighestLevel))]
CalcVolume2 = (HighVolume x LevelRatio2)
LevelRatio3 = [((Level-LowLevel) x (Level-HighLevel))/
((HighestLevel-LowLevel) x (HighestLevel-HighLevel))]
CalcVolume3 = (HighestVolume x LevelRatio3)
TOV = (CalcVolume1 + CalcVolume2 + CalcVolume3)

Where (conditions)
Level = Current Tank Liquid Level
LowLevel = Strapping point level in table immediately below Level
HighLevel = Strapping point level in table immediately above Level
HighestLevel = Strapping point level in table immediately above HighLevel
LowVolume = Strapping point volume in table for LowLevel point
HighVolume = Strapping point Volume in table for HighLevel point
HighestVolume = Strapping point Volume in table for HighestLevel point

Spherical tanks

Calculations
Top1 = LowestVolume x (Level-LowLevel) x (Level-HighLevel) x (Level-HighestLevel)
Top2 = LowVolume x (Level-LowestLevel) x (Level-HighLevel) x (Level-HighestLevel)
Top3 = HighVolume x (Level-LowestLevel) x (Level-LowLevel) x (Level-HighestLevel)

Calculations
Top4 = HighestVolume x (Level-LowestLevel) x (Level-LowLevel) x (Level-HighLevel)
Bottom1 = (LowestLevel-LowLevel) x (LowestLevel-HighLevel) x (LowestLevel-HighestLevel)
Bottom2 = (LowLevel-LowestLevel) x (LowLevel-HighLevel) x (LowLevel-HighestLevel)
Bottom3 = (HighLevel-LowestLevel) x (HighLevel-LowLevel) x (HighLevel-HighestLevel)
Bottom4 = (HighestLevel-LowestLevel) x (HighestLevel-LowLevel) x (HighestLevel-HighLevel)
TOV = (Top1/Bottom1 + Top2/Bottom2 + Top3/Bottom3 + Top4/Bottom4)

Where (conditions)
Level = Current Tank Liquid Level
LowLevel = Strapping point level in table immediately below Level
HighLevel = Strapping point level in table immediately above Level
HighestLevel = Strapping point level in table immediately above HighLevel
LowestLevel = Strapping point level in table immediately below LowLevel
LowVolume = Strapping point volume in table for LowLevel point
HighVolume = Strapping point Volume in table for HighLevel point
HighestVolume = Strapping point Volume in table for HighestLevel point
LowestVolume = Strapping point Volume in table for LowestLevel point

Polynomial spherical tank

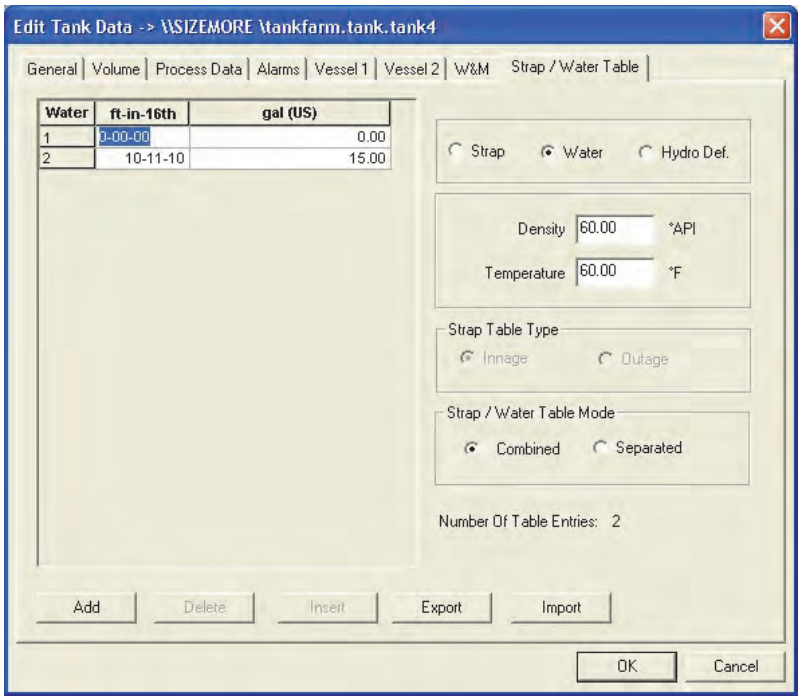
Calculations
$TOV = P \cdot (Lx' + L0')^3 + Qn \cdot (Lx' + L0')^2 + Rn \cdot (Lx' + L0') + Sn + VR'$

Where (conditions)
Ln-1= Lxw < Ln and n is an integer between 1 = n < 9
Lwx' =Lwx/1000
VR' = VR/1000
Lx = measured liquid level (mm)
L0 = correction volume (mm)
Ln = levels at the registered pointers (mm)
P = constant (±X. XXXXXXXXX)
Qn = constant (±XXX. XXXXXXX)
Rn = constant (±XXXX. XXXXXX)
Sn = constant (±XXXXXXX. XXX)
VR : correction volume (L)

Product and Water Strapping Tables

It is typical for FuelsManager customers to have two separate strapping tables, one for product and one for water bottom. These tables can be either related to one another or totally independent. This section details the calculation methods used by FuelsManager when configured to use separate water and product tables.

In order to configure FuelsManager to use separate water and product tables, simply use the Strap/Water table tab of the Edit Tank Data dialog to either manually enter a water table or import a previously defined water table.



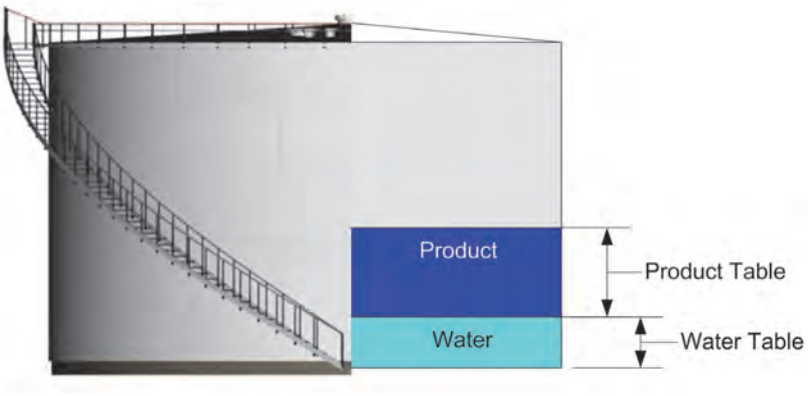
Note Use the import option to save time by importing previously defined product or water tables.

When using product and water tables, Configuration can be used to set the water and strapping table method for either integrated Product and Water tables or Separated Product and Water tables. Under Strap/Water Table Mode, select either Combined or Separated.

Integrated Product and Water Tables (Combined)

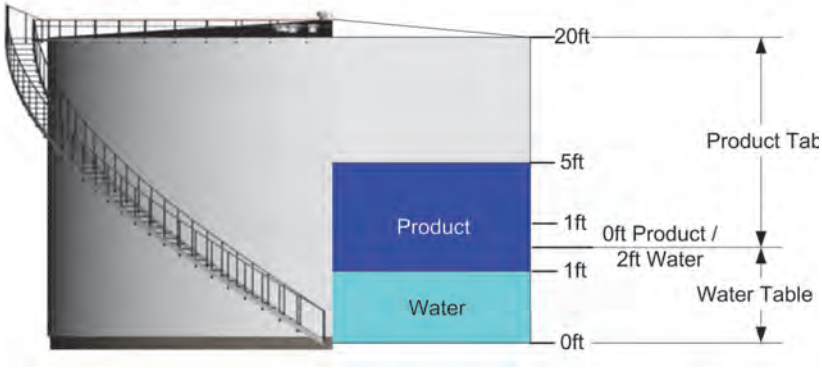
The key concept in the integrated product and water table mode of operation is that the top point of the water table is assumed to coincide with the bottom point of the product table.

In the integrated product and water table mode, The product table begins were the water table ends



Example 1

Water level lower than the top point in the water table:



Example 1 shows how the product and water volumes are calculated when the water level is less than the water table

Product Table		Water Table	
Product Level	**Product Vol**	**Water Level**	**Water Vol**
0	0	0	0
1ft	1000 gal	1ft	1000 gal
2ft	2000 gal	2ft	2000 gal
5 ft	5000 gal		
20 ft	20,000 gal		

- Measured product level = +5ft
- Measured water level = +1ft

From the product table, the product volume = 5000 gal

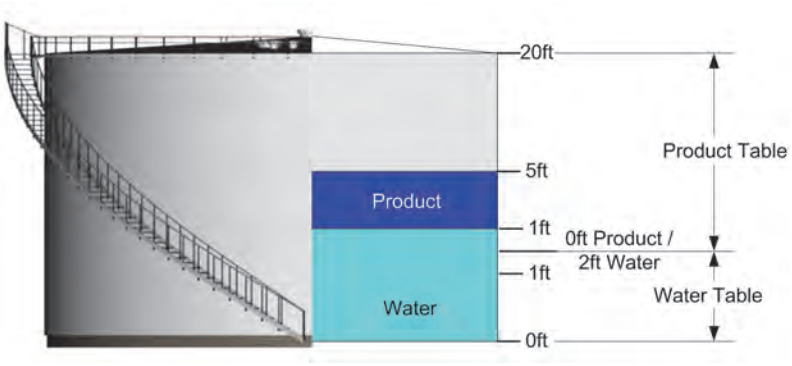
FuelsManager recognizes that the measured product level is below that of the bottom point in the product table, so it uses the top of the water table to extend the range:

- From the water table +1ft [+2ft (top) minus +1ft (measured water level)] = 1000 gal
- Total product volume for +5ft of product and +1ft of water = 6000 gal

From the water table +1ft of water = 1000 gal

Example 2

Water level higher than the top point in the water table:



Example 2 shows how the product and water volumes are calculated when the water level is higher than the top point in the water table

Product Table		Water Table	
Product Level	**Product Vol**	**Water Level**	**Water Vol**
0	0	0	0
1ft	1000 gal	1ft	1000 gal
2ft	2000 gal	2ft	2000 gal
5 ft	5000 gal		
20 ft	20,000 gal		

- Measured product level = +5ft
- Measured water level = +3ft

From the product table the product volume = 5000 gal

FuelsManager recognizes that the measured water level is above that of the top point in the water table, so it uses the bottom of the product table to extend the range:

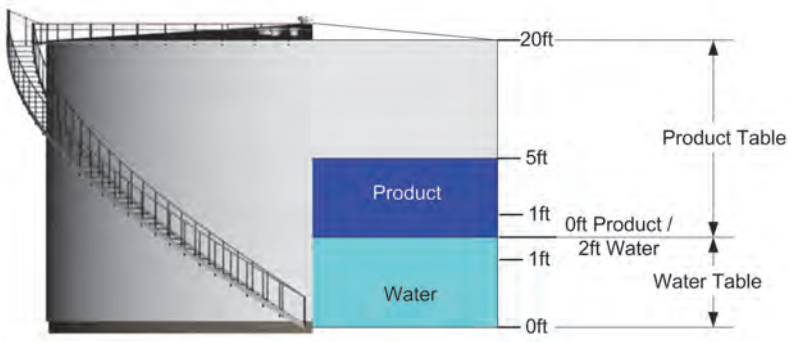
- From the water table +2ft of water = 2000 gal
- From the product table +1ft of water = 1000 gal
- Total water volume for + 3ft of water = 3000 gal

Subtracting the 1ft of water volume from the product volume (5000 – 1000 gal) equals: Product volume = 4000 gal

Example 3

Water level equals the top point in the water table:

Example 3 shows how the product and water volumes are calculated when the water level is equal to the top point in the water table



This example shows how the product and water volumes are calculated when the water level is equal to the top point in the water table.

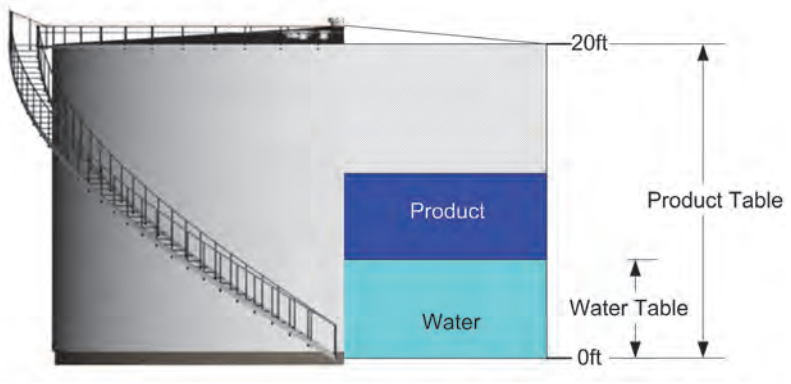
Product Table		Water Table	
Product Level	**Product Vol**	**Water Level**	**Water Vol**
0	0	0	0
1 ft	1000 gal	1 ft	1000 gal
2 ft	2000 gal	2 ft	2000 gal
5 ft	5000 gal		
20 ft	20,000 gal		

Separate Product and Water Tables (Separated)

When configured to use the separate product and water table mode, FuelsManager assumes no correlation between the water and product tables.

Since this mode of operation provides no correlation between the product and water tables, it is assumed that the tables start at the same point and overlap in the lower part of the tank.

Separated strapping and water tables example



- Water volume = Measured water level lookup in water table
- Product volume = Measured product level lookup in product table

Floating

Roof Adjustment (FRA)

Tanks with floating roofs require a correction to offset the effect of the displacement of the floating roof.

Default

This correction is calculated in the following manner.

If no floating roof or level is <= Roof Landed Height:

FRA = 0
No Correction Required.

If floating roof is not included in the strap table:

FRA = Roof Mass/ProductDensity

If floating roof is included in the strap table:

FRA = (RoofMass/StrapDensity) – (RoofMass/ProductDensity)

Japanese correction methods

If you select any of the correction methods designated 'Japan' the floating roof correction is calculated in the following manner:

If the 4th digit after decimal point of density is Zero such as r15 = X.XXX0

FRA = FRW / r15

Where:

FRW: Floating Roof Weight
If the 4th digit after decimal point of density is other than ZERO
such as r15 ¼ X.XXX0 (4th digit after decimal is 1~9).
If r15=X.XXNX then, the density will divided by Low and High.
Low density is r15L =X.XXN0 and High density is r15H = X.XXN0 + 0.001
FRAL = FRW / r15L (Rounding 4th digit after decimal point)
FRAH = FRW / r15H (Rounding 4th digit after decimal point)

$$FRA = FRAL - \left\{ (FRAL - FRAH) \frac{\rho 15 - \rho 15L}{\rho 15H - \rho 15L} \right\}$$

Note In the Critical Zone, Between Roof Landed Height and Roof Floating Height, Fuels-Manager applies the full amount of the FRA.

Bottom Sediment Water (BS&W)

Product samples are periodically taken to determine its quality and purity. Analyzing these samples results in a purity measurement referred to as percentage bottom sediment and water (%BS&W). The operator usually manually enters this value. The %BS&W value differs from the Water volume and Solids volume values in that, the %BS&W impurities are suspended in the product, the water and solids volumes have settled and rest at the bottom of the tank.

Volume of Sediment and Water (VSW)

This is the volume associated with the percentage of impurities suspended in the product (%BSW) and is calculated as follows:

VSW = (TOV - FW) x (%BSW/100.0)

Where:

VSW	=	Volume of Sediment and Water
TOV	=	Total Observed Volume
%BSW	=	Percentage of Bottom, Sediment and Water

Free water

This is the amount of water in the bottom of the tank and Tank Bottom Solids (if any). This is calculated as follows:

FW = H20VOL + SOLVOL

Where:

FW	=	Combined Water and Solids volume
H20VOL	=	Water Volume
SOLVOL	=	Solids Volume

Correction volume

This is the un-measurable volume associated with line segments and manifolds connected to the tank. The operator usually manually enters this value.

Volume Correction Factor (VCF)

This is the correction factor calculated via one of the methods defined in the table(s) above. The value is used to correct the gross volume for the effects of temperature.

Tank Shell Correction (CTSh)

Volume correction for the temperature of the shell. Compensates for the effect of ambient and liquid temperature effects on the shell of the tank.

CTSh is calculated as follows:

CTSh = 1 + ExpCoef x DTs + AreaCoef x (DTs x DTs)

Where:

ΔTs = Ts-Ref Temp (60°F)	
ExpCoef =	
	MILD STEEL = 12.4 x 10-6
	STAINLESS STEEL = 9.6 x 10-6
	ALUMINUM = 13.0 x 10-6
AreaCoef = 4.0 x 10-9	

For Non-Insulated Tanks:

Ts = [(7xTl) + Ta] / 8

Where:

Tl = Tank Liquid Temperature
Ta = Ambient Temperature

For insulated tanks:

Ta = Tl = Liquid temperature

Setting the Tank Material to "Other" allows you to manually enter the ExpCoef and the AreaCoef.

Gross Observed Volume (GOV)

The strap volume value needs to be corrected in order to arrive at the Gross Observed volume data. The exact calculation used is dependent on the how the tank point was configured. The following correction methods are available:

Default

The following formula is used to calculate Gross Volume:

GOV = [(TOV-FW) x CTSh] +/- FRA + CORRVOL

Where:

TOV	=	Strap Volume at the current tank level
FW	=	Free water + Tank Bottom Solids (if any)
CTSh	=	Tank Shell Correction
FRA	=	Floating Roof Adjustment
CORRVOL	=	Un-measurable volume associated with tank pipe work

Pre 1980

If a volume correction method with the 1980 designation is selected. The following formula is used to calculate Gross Volume:

GOV = TOV +/- FRA + CORRVOL

Where:

TOV	=	Strap Volume at the current tank level
FRA	=	Floating Roof Adjustment
CORRVOL	=	Un-measurable volume associated with tank pipe work

Japanese correction methods

If a volume correction method with the 'Japan' designation is selected. The following additional options are available:

GOV = (TOV-FW) +/- FRA - (1.0 – %BSW/100.0) + CORRVOL

Where:

TOV	=	Strap Volume at the current tank level
FW	=	Free water + Tank Bottom Solids (if any)
FRA	=	Floating Roof Adjustment
%BSW	=	Percentage of bottoms, sediment and water impurities.
CORRVOL	=	Un-measurable volume associated with tank pipe work

Water not subtracted	The value of FW in the gross volume calculation is always zero
Water Subtracted from Gross Volume	The FW value is subtracted from the TOV as defined above
Water Subtracted from Net Volume	The FW is zero in the gross volume calculation, it is subtracted from the Net Volume (see below)
VSW not subtracted	The value of %BSW in the gross volume calculation is always zero
VSW Subtracted from Gross Volume	The %BSW value is subtracted from the TOV as defined above
VSW Subtracted from Net Volume	The %BSW is zero in the gross volume calculation, it is subtracted from the Net Volume (see below)
Roof Type = Kaiji-Kentei-Kyoukai	The FRA value is zero, it is applied to the Net Volume calculation (see below)
Roof Type = Shin-Nihon-Kentei-Kyoukai 1, 2 or 3	The FRA value is zero, it is applied to the Net Volume calculation (see below)

Net Standard Volume (NSV)

Default

Net volume (net standard volume) is defined as Gross observed volume corrected for %BS&W and temperature. The following equation is used to calculate net volume:

NSV = [(GOV x (1.0–%BS&W/100.0)) x VCF]

Where:

NSV	=	Net Standard Volume
FRA	=	Floating Roof Adjustment
%BSW	=	Percentage of bottoms, sediment and water impurities
VCF	=	Volume Correction Factor

Pre 1980

If a volume correction method with the 1980 designation is selected. The following formula is used to calculate Gross Volume:

NSV = [(GOV - FW) x (1.0-%BS&W/100.0)) x VCF]

Where:

NSV	=	Net Standard Volume
FW	=	Free water + Tank Bottom Solids (if any)
FRA	=	Floating Roof Adjustment
%BSW	=	Percentage of bottoms, sediment and water impurities
VCF	=	Volume Correction Factor

Japanese correction methods

If a volume correction method with the 'Japan' designation is selected. The following additional options are available:

NSV = [(GOV - FW) x (1.0-%BS&W/100.0)) x VCF]

Where:

NSV	=	Net Standard Volume
GOV	=	Gross Observed Volume
FW	=	Free water + Tank Bottom Solids (if any)
%BSW	=	Percentage of bottoms, sediment and water impurities
VCF	=	Volume Correction Factor

Water not subtracted	The value of FW in the net volume calculation is always zero
Water Subtracted from Net Volume	The FW value is subtracted from the TOV as defined above

Water not subtracted	The value of FW in the net volume calculation is always zero
Water Subtracted from Gross Volume	The FW is zero in the net volume calculation, it is subtracted from the Gross Volume (see above)
VSW not subtracted	The value of %BSW in the net volume calculation is always zero
VSW Subtracted from Net Volume	The %BSW value is subtracted from the TOV as defined above
VSW Subtracted from Gross Volume	The %BSW is zero in the Net volume calculation, it is subtracted from the Gross Volume (see above).

In addition, if a correction method with the 'Japan' designation was selected, the following Net volume calculation will be applied.

Kaiji-Kentei-Kyoukai

Floating Roof Tank Net volume of "Kaiji-Kentei-Kyoukai" (Japanese authorization organization) uses the following equation.

NSV=(TOV-FW) x CTSh x VCF x (1.0 – BS&W/100.0)- FRA

Where:

NSV	=	Net Standard Volume
TOV	=	Strap Volume at the current tank level
FW	=	Free Water
CTSh	=	Tank Shell Correction.
VCF	=	Volume Correction Factor
%BSW	=	Percentage of bottoms, sediment and water impurities
FRA	=	Floating Roof Adjustment

Shin-Nihon-Kentei-Kyoukai 1

Floating Roof Tank Net volume of Shin-Nihon-Kentei-Kyoukai 1 (Japanese authorization organization) uses the following equation.

$$NSV = \left\{(TOV - FW) \times CTSh - \left(\frac{1}{VCF \times \rho 15} - \frac{1}{BSG}\right) \times FRA\right\} \times VCF \times \left(1 - {}^{BS\&W}/_{100}\right)$$

Where:

NSV	=	**Net Standard Volume**
TOV	=	Strap Volume at the current tank level
FW	=	Free Water
CTSh	=	Tank Shell Correction
r15	=	Product Density
BSG	=	Strap Density
VCF	=	Volume Correction Factor
%BSW	=	Percentage of bottoms, sediment and water impurities

NSV	=	Net Standard Volume
FRA	=	Floating Roof Adjustment

Shin-Nihon-Kentei-Kyoukai 2

Floating Roof Tank Net volume of “Shin-Nihon-Kentei-Kyoukai 2” (Japanese authorization organization) uses the following equation.

$$NSV = (TOV - FW) \times CTSh \times VCF \times (1.0 - BS\ \&\ W/100) - \left(\frac{1}{\rho 15} - \frac{1}{BSG}\right) \times FRA$$

Where:

NSV	=	Net Standard Volume
TOV	=	Strap Volume at the current tank level
FW	=	Free Water
CTSh	=	Tank Shell Correction
r15	=	Product Density
BSG	=	Strap Density
VCF	=	Volume Correction Factor
%BSW	=	Percentage of bottoms, sediment and water impurities
FRA	=	Floating Roof Adjustment

Shin-Nihon-Kentei-Kyoukai 3

Floating Roof Tank Net volume of “Shin-Nihon-Kentei-Kyoukai3” (Japanese authorization organization) uses the following equation.

It does not apply the roof correction to the net volume calculation.

NSV = (TOV - FW) x CTSh x VCF x (1.0 - BS&W/100)

Where:

NSV	=	Net Standard Volume
TOV	=	Strap Volume at the current tank level
FW	=	Free Water
CTSh	=	Tank Shell Correction
VCF	=	Volume Correction Factor
%BSW	=	Percentage of bottoms, sediment and water impurities

MASS

Default

Mass is defined as net standard volume corrected for density at the observed temperature. The following equation is used to calculate Mass:

Mass = NSV x Standard Density

In tables where density is expressed in API, Density is calculated as:

Density (KG/M3) = 141.5 x 999.012/(API Gravity + 131.5)

Japanese correction methods

If a volume correction method with the 'Japan' designation is selected. The following additional options are available:

Weight in air

NW =NSV x (r15 - 0.0011)

Where:

NW	=	Net Weight
NSV	=	Net Standard Volume
r15	=	15°C liquid density
0.0011	=	atmosphere conversion coefficient

Weight in a pressurized tank

NW = NSV x r15 + GW

$$GW = (V\,max - VG) \times GD \times \left(1 + P\frac{273}{273 + GT}\right)$$

The GW is the Gas weight derived by following equation.

Where:

NW	=	Net Weight
NSV	=	Net Standard Volume
r15	=	15°C liquid density
GW	=	Gas weight
GD	=	Gas density
P	=	Gas Pressure
GT	=	Gas Temperature

The Molar method

NW = NSV (r15 - 0.0011) + GW

The GW is the Gas Weight derived by following equation.

$$GW = (V\ max\text{-}GOV)\ \frac{273}{273 + GT} \times \frac{1.033+P}{1.033} \times \frac{M}{22.4} \times \frac{1}{p15} \times \frac{1}{1000} \times (\rho 15\text{-}0.0011)$$

Where:

NW	=	Net Weight
NSV	=	Net Standard Volume
GW	=	Gas weight
GOV	=	Gross Observed Volume
Vmax	=	Total Tank Capacity
r15	=	15°C liquid density
P	=	Gas Pressure
GT	=	Gas Temperature
M	=	Mole constant

Food oil method

NW=GOV x r15

Where:

NW	=	Net Weight
GOV	=	Gross Observed Volume
r15	=	15°C liquid density

Chinese Correction Method

If the GB/T Volume Correction Method is selected, the following additional mass calculation options are available.

- Sinopec Method: $NW = (NSV \times (\rho 20 - 1.1) - G) \times (1 - W)$
- PetroChina Method: $NW = NSV \times (1 - W) \times (p20 - 0.0011)$

Where

NSV	=	Net Standard Volume (Sinopec method NSV in liters, PetroChina method NSV in M3)
W	=	Water percentage (% BSW)
G	=	Floating root mass (kg)
p20	=	Density of product @ 20°C (Kg/m3)
NW is returned in kg for Sinopec method NW is returned in metric tones for PetroChina method		

Available volume/available mass

Available Volume is defined as the amount of net or gross volume available for pumping out of a tank. It is calculated as “0” if one or more of the following conditions are true:

Level <= Low level Alarm, Low-Low level Alarm, or User Defined
Level <= Water Volume
Level <= Minimum level as defined in the strap table

If these conditions are not met, the available volume calculation is defined as using the following equations:

Net Available Volume:

NAV = Current Net Volume of Tank – [(((SVC-FW) x CTSh x ((100.0-%BS&W)/ 100.0)) +/- FRA) x VCF]

Available Mass:

AM = NAV x Standard Density

Gross Available Volume:

GAV = Current Gross Volume of Tank – [((SVC-FW) x CTSh) +/- FRA]

Where:

SVC	=	Strap Volume at the Minimum Working level
FW	=	Free water + Tank Bottom Solids (if any)
CTSh	=	Tank Shell Correction
FRA	=	Floating Roof Adjustment
VCF	=	volume correction Factor

Remaining volume/remaining mass

Remaining volume is defined as the amount of net or gross volume that can be pumped into a tank. It is calculated as “0” if none or more of the following conditions are true:

Level >= High level Alarm, High-High level Alarm, or User Defined
Level >= Maximum level as defined in the strap table

If these conditions are not met, the remaining volume calculation is defined using the following equations:

Net Remaining Volume:

NRV = [((SVC-FW) x CTSh x ((100.0-%BS&W)/100.0) +/- FRA) x VCF] – Current Net Volume in Tank

Remaining Mass:

RM = NRV x Standard Density

Gross Remaining Volume:

GNV = [((SVC-FW) x CTSh) +/- FRA] – Current Gross Volume in Tank

Where:

SVC	=	Strap Volume at the Maximum Working level
FW	=	Free water + Tank Bottom Solids (if any)
CTSh	=	Tank Shell Correction
FRA	=	Floating Roof Adjustment
VCF	=	volume correction Factor

LPG quantity calculation from liquid density

Calculation of LPG quantity from liquid density at 15°C (LPG °C & LPG °C 1980)

Overall calculation scheme:

1. Measure level, average liquid temperature, average vapor temperature, average pressure in vapor space.
2. Input liquid density at 15°C.
3. Calculate VCF and hence liquid density at tank conditions.
4. Correct measured level for thermal effects and buoyancy. This depends upon the nature of the gauge.
5. Convert corrected level to liquid volume.
6. Correct liquid volume for tank thermal expansion and pressure effects.
7. Convert liquid volume to equivalent volume at 15°C.
8. Calculate liquid mass from liquid volume at 15°C and liquid density at 15°C.
9. Correct total tank volume, for thermal and pressure effects.
10. Calculate vapor volume at measured temperature from corrected total volume and liquid corrected volume at tank conditions.
11. From liquid density, vapor temperature and vapor space pressure calculate vapor density.
12. Calculate vapor mass from vapor volume and vapor density at measured conditions.
13. Calculate total mass as liquid mass plus vapor mass.
14. Calculate weight from total mass and liquid density.

15. Display the required results

Details for each step

Step 1

The Liquid temperature and vapor temperatures should both be weighted averages to reflect the volume in each vertical section. In the liquid phase there should be little temperature gradient and a single measurement should be adequate. In the vapor phase a gradient may be more apparent and the average of the vapor temperature at the surface and at the top of the tank should be used.

Measured values:

H	gauge reading of liquid level in mm
TL	average liquid temperature °C
TV	average vapor temperature °C
P	vapor space pressure in bar g.

Step 2

Density is to be input by the operator. This should be the liquid density at 15°C, and should be in units of kg/m3.

Input value

DENL15 – liquid density at 15°C (kg/m3)

Step 3

Calculation of VCF and hence liquid density at tank conditions may be calculated as follows:

X	=	(DENL15 - 500)/25
YI	=	0.296 – 0.2395 x X + 0.2449167 x X2–0.105 x X3 + 0.01658334 x X4
Y2	=	363.8 + 4.924927 x X + 13.66258 x X2 – 6.375 x X3 + 1.087503 x X4
TR	=	288.2 / Y2
TT	=	(1 – TR) ^ (1 / 3)
V0	=	1 – 1.52816 x TT + 1.43907 x TT2 – 0.81446 x TT3 + 0.190454 x TT4
VD	=	(–0.296123 + 0.386914 x TR – 0.427258 x TR2 – 0.0480645 x TR3) / (TR – 1.00001)
V1	=	V0 x (1 – Y1 x VD)
TR	=	(TL + 273.2) / Y2
TT	=	(1 – TR) ^ (1 / 3)
V0	=	1 – 1.52816 x TT + 1.43907 x TT2 – 0.81446 x TT3 + 0.190454 x TT4
VD	=	(–0.296123 + 0.386914 x TR – O.427258 x TR2 – 0.0480645 x TR3) / (TR – 1.00001)
V2	=	V0 x (1 – Y1 x VD)
VCF	=	V1 / V2

VCF should be rounded to 5 decimal places.

The density of liquid at liquid temperature is given by:

DENL = DEN15 x VCF

Step 4

The following formulae are used for making corrections to liquid level gauges:

(a) Float buoyancy correction. This is necessary to correct for changes in liquid density between calibration and use. The correction is achieved as:

$$\Delta h_1 = 1.273 \times 10^6 \times \frac{m}{d^2}\left(\frac{1}{P} - \frac{1}{P_1}\right)$$

Where:

Δh1 =	correction to the gauge readout for float buoyancy in mm
m	mass of float in grams
d	diameter of float in mm
p1	density of liquid at the time of calibration
p	density of liquid at the time of gauging

This correction is only applied to float gauges. It does not apply to non-contact measurement devices.

Corrected height = measured height + Dh

(b)Thermal correction. This is necessary to account for the thermal expansion of the tank or stilling well and the gauge wire. For a float gauge this will be carried out in addition to the buoyancy correction.

The correction is:

$$\Delta h_2 = \alpha w(15 - TV)(HT - H) - \alpha_m(15 - TV)(HT - H) - \alpha_m(15 - TL)H$$

Where:

Dh2	correction to gauge readout for thermal expansion
aw =	coefficient of thermal expansion of gauge wire /°C
am =	coefficient of thermal expansion of gauge mounting (tank or well) /°C
TV =	average vapor temperature °C
TL =	average liquid temperature °C
HT =	total height of mounting (tank or well) in mm
H =	depth of liquid in mm

Note When a float gauge is used H is the value after the buoyancy correction has been carried out.

The use of as the coefficient of thermal expansion of the tank or stilling well depends upon the mounting of the gauge. When the gauge is mounted on the tank, or on the well but this is not rigidly fixed to the tank base, the coefficient of the tank is used. The well coefficient is only used when the gauge is mounted on the well and this is rigidly fixed to the tank bottom. In this case movement of the gauge, relative to the bottom of the tank, is governed by stilling well expansion and contraction.

Typical values of thermal expansion coefficients are:

Aluminium	0.000023	/°C
Mild steel	0.000011	/°C
Stainless steel	0.000017	/°C

The corrected level (HC) is given by: $HC = H + \Delta H_1 + \Delta H_2$

Step 5

The conversion of corrected liquid level to liquid volume is carried out using stored values of key level/volume data points for the tank, with Lagrange cubic interpolation between. The calculation for liquid value (VL) is defined in Spherical Tanks in the Strap Table Volume section, earlier in this chapter. For the LPG calculation method the corrected level value HC is used in the conversion of level to liquid volume.

Step 6

Liquid volume needs to be corrected for the thermal expansion of the tank shell. The nature of the correction depends upon the type of tank.

Thermal correction $C = F\,\alpha T(TL - 15)$

Where aT = coefficient of thermal expansion of tank /°C

For a vertical cylinder:

	F = 2

For a horizontal cylinder:

	F = 1 + 2 (A - sin A)/(A - sin A cos A)
where	HC = liquid depth (corrected)
	R = cylinder radius
	$A = \cos^{-1}\left(1 - \frac{HC}{R}\right)$

For a sphere:

	F = HC2 R/(HC2r - HC3/3)
where	H = liquid depth
	R = cylinder radius

A pressure correction should be applied. This will take into account the vapor space pressure and the hydrostatic head of liquid. The average pressure throughout the sphere is assumed to be one half the total liquid level, converted to a pressure, plus the vapor space pressure. The linear stress, is then calculated and this used, with Youngs modulus, to calculate the increase in radius. The F factor necessary for temperature correction is again used to convert change in radius to change in liquid volume.

The units of Youngs modulus are generally known in bar. The units of length used in the calculation of stress do not matter, but the pressure must be in bar, to match the units of Youngs modulus. The following equations are based upon the use of bar for Youngs modulus. Note the P is in bar g and HC is in mm. Calculate average pressure as:

	PAV = P + DENL x HC/2.04 x 107
where	PAV = Average vapor pressure (Bar)
	P = Pressure in vapor space

	PAV = P + DENL x HC/2.04 x 107
	DENL = Liquid density (kg/m3)
	H = Liquid Level (mm)

Calculate external radius as:

	ROUT = R + THICK
where	ROUT = External radius
	R = radius
	THICK = Shell thickness

Calculate stress as

$$S = \frac{PAV}{2} \times \frac{2 \times R^3 \times ROUT^3}{ROUT^3 - R^3}$$

Calculate increase in linear dimension factor as:

CORRP = 1 + F x S/YOUNG

The value of S calculated is also used in correcting the total volume of the tank in step 9.

Typical values for Youngs modulus are:

Carbon steel	2.1 x 106 bar
Stainless steel	1.9 x 106 bar

Corrected liquid volume

VLC = VL x CORRT x CORRP

Step 7

The corrected volume at liquid temperature is converted to a volume at 15°C using the volume correction factor (VCF) calculated in Step 3 as:

	VLC15 = VLC x VCF
Where	VLC15 = Volume @ 15°C
	VLC = Volume at liquid temperature
	VCF = Volume Correction Factor

Step 8

Liquid mass is calculated from liquid density at 15°C and corrected liquid volume at 15°C. The units here are tonnes.

ML = VLC15 x DENL15 / 1000

Where ML is Liquid Mass

Step 9

Total tank volume is corrected for temperature and pressure using the overall mean tank temperature. This is best calculated for the liquid volume, liquid temperature and total volume and vapor temperature as:

	TAV = (TL x VLC + (VT - VLC) x TV) / VTC
	TAV = Average overall tank temperature
	TL = Temperature of liquid
	TV = Temperature of vapor
	VTC = Total tank volume

The correction is then carried out as:

	CORRT2 = 1 + 3 x aT x (TAV - 15)
Where	αT = Coefficient of thermal expansion of the tank /°C

The correction for pressure is applied as in step 6 except that 3 replaces F in the calculation of the correction factor. S is the previously calculated value.

i.e.	CORRP2 = 1 + 3 x S/YOUNG
	VTC = VT x CORRT2 x CORRP2
Where	VTC = Volume of tank corrected for temperature and pressure

Step 10

Vapor volume is calculated from corrected liquid volume at tank conditions (Step 5) and total tank volume corrected to measured conditions (Step 9) as:

W = VTC - VLC	
Where	VV = Vapor volume
	VTC = Total tank volume
	VLC = Corrected liquid volume

Step 11

Vapor density may be calculated from liquid density, vapor temperature and vapor space pressure as follows:

Calculate molecular weight from liquid density at 15°C as:

	X = (DENL15 = 500) / 33.3333
	MW = 43 + 4.4 x X + 1.35 x X2 - 0.15 x X3

Calculate critical temperature from liquid density at 15°C as:

	TC = 364 + 13.33 x X + 8.5 x X2 - 1.833 x X3

Calculate critical pressure from liquid density at 15°C as:

	PC = 43 = 2.283 x X + 0.05 x X2 - 0.0667 x X3

Calculate reduced temperature from vapor temperature and critical temperature as:

	TR = (TV + 273.2) / TC
Where	TR = Temperature of vapor

Calculate reduced pressure from vapor space pressure and critical pressure as:

	PR = (P + 1.013)/PC
Where	P = pressure in vapor space

Calculate W as:

	W = 0.214 - 0.034333 x X + 0.005 x X2 - 0.0001667 x X3

Calculate z by locating the smallest root of:

	Z - Z + Z x (A-B-B2) - A x B

where:	$A = \left[0.42747 \times L^2 \times \frac{PR}{TR}\right] / TR$
	B =0.08564 x PR/TR
	L = 1 + (0.48 + 1.574 x W - 0.176 x W2) x (1-SQR(TR))

This may be solved by Newton-Raphson as follows:

	Z=1.5
20	F= Z3-Z2 + Z x (A-B-B2)-A x B
	IF ABS(F) < 0.0001 THEN 70
	F1= 3 x Z2 - 2 x Z + A-B-B2
	Z= Z-F/F1
	GOTO 20
	check range of Z
70	IF Z < 0.2 OR Z > 2 THEN Z = 1
	RETURN

This routine always appears to converge and to give Z in the range 0.2 to 1, which is correct for typical LPG storage conditions.

Vapor density is calculated from molecular weight, vapor temperature, vapor space pressure and Z factor as:

$$DENV = \frac{MW \times (P + 1.013)}{0.08314 \times (TV + 273.2) \times Z}$$

The units of DENV are kg/m3.

Step 12

Vapor mass is calculated as the product of vapor volume and vapor density both at tank conditions as:

	MV = VV x DENV/1000

Note that MV is in tonnes to match the units of liquid mass

Step 13

Total mass is the sum of liquid mass and vapor mass:

	MT = MV + ML
Where	MT = Total mass
	MV = Vapor mass
	ML = Liquid mass

Step 14

Total weight is calculated from total mass and liquid density as:

	WT = MT x (1-1.2/DENL15)/0.99985

Sample LPG calculation

Stored Data

Calibration (7 points only) m3

mm			mm3		
H(1)	=	0	V(1)	=	0
H(2)	=	2000	V(2)	=	29.213
H(3)	=	2500	V(3)	=	42.217
H(4)	=	3000	V(4)	=	56.311
H(5)	=	3500	V(5)	=	70.627
H(6)	=	4000	V(6)	=	84.122
H(7)	=	6000	V(7)	=	114.211

Total tank volume VT = 114.211 m3

Coefficients of thermal expansion (mild steel):

Gauge wire	aW = 0.000017	/°C
Gauge meeting	aM = 0.000017	/°C
Tank Shell	aT = 0.000017	/°C

Youngs modulus:

YOUNG	2.06 x 106 bar

Float data:

Mass	(m)	1033.5	g
Diameter	(d)	288	mm
Density of			
Liquid of			
Time of Calibration	(DENL1)	999.1	kg/m3

Tank data:

Radius	R	= 3000	mm
Tank Height	HT	= 6000	mm
Shell Thick	THICK	= 18	mm

Input Data

Level	H	= 5062	mm
Liquid Temp	TL	= 18.5	°C
Vapor Temp	TV	= 21.3	°C
Vapor Pressure	P	= 9.1	barg

Check Data

Liquid Density DENL 15°C	= 505.0

Step3	VCF=0.98982 — Volume Correction Factor
	DENL=499.76 — Liquid Density @ liquid temperature

Step4	DH1=15.86 — Gauge correction for float buoyancy
	DH2= 0.3 — Gauge correction for thermal expansion
	HC=5078.16 — Corrected gauge reading (level)

Step5	Interpolation uses points 4,5,6,7
	VL=106.731 — Liquid value

Step6	CORRT = 1.000137 — Thermal correction
	VLC = 106.837 — Liquid volume
	CORRP = 1.000856 — Pressure correction

Step 7	VCF = 0.98962
	VLC15 = 105.728

Step 8	ML = 53.39264 (tonnes) — Liquid mass

Step 9	CORRT2= 1.000188 — Thermal correction
	CORRP2= 1.00112 — Pressure correction
	VTC = 114.3603 — Volume of tank corrected for temperature

Step 10	VV = 7.5232 — Vapor Volume

Step 11	MW = 43.6899 — Molecular weigh
	TC = 366.1846 — Critical temperature
	PC = 42.6585 — Critical pressure
	TR = 0.80424 — Reduced temperature
	PR = 0.23707 — Reduced pressure
	W = 0.20896
	Z = 0.81354
	DENV = 22.18134 — Vapor density

Step 12	MV = 0.16687 — Vapor mass

Step 13	MT = 53.5596 tonnes — Total mass

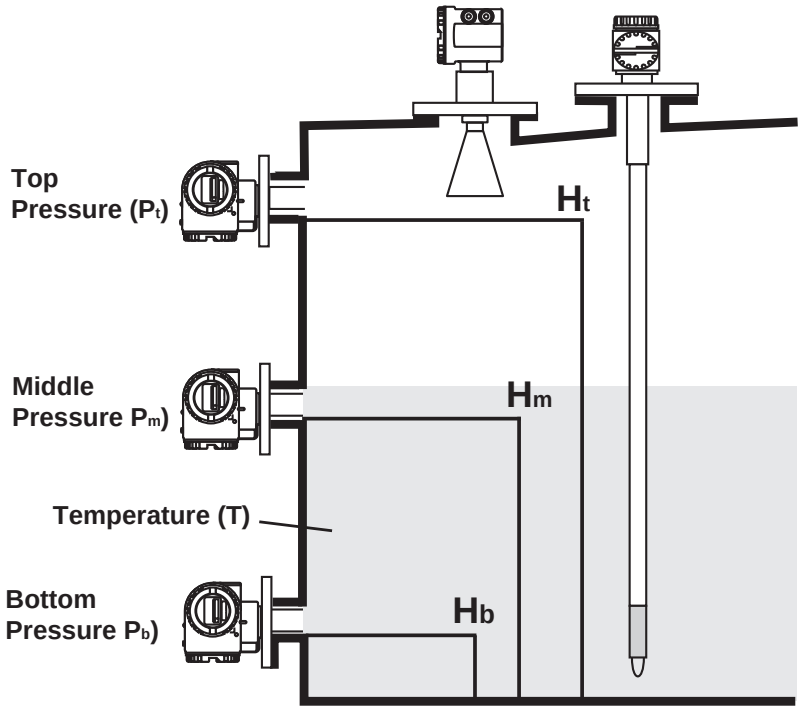
Step 14	mass to weight conversion fraction = 0.99777
	WT = 53.4404 tonnes Total weight

Hydrostatic & Hybrid Tank Calculations

FuelsManager provides calculations of tank levels and volumes based on measurements at pressure of precise positions on the tank. These calculation techniques fall into two main groups.

Hydrostatic	Measurement of pressure at one or more points in the tank and the subsequent calculation of the product density and tank level. This type of measurement technique can be used without a level gauge
Hybrid	This technique combines the measurement of product density, via pressure measurement of one or more points in the tank, and the direct measurement of product level with a level gauge

FuelsManager provides configuration parameters for up to three pressure instruments as shown below. The following shows the use of three pressure instruments; however, FuelsManager allows for configuration with 1, 2, or 3 transmitters.



In addition, FuelsManager allows for the configuration of the exact position of the tank, including the latitude and elevation above sea level. These parameters allow for corrections due to the effects of local gravity and air density as defined below.

$$(D_A)\text{Air Density} = 353 \times \exp\left[\frac{-\text{Elevation}/8434.41}{\text{Air Temp} + 273.16}\right]$$

Where	Elevation is in meters
	Air Temp is in °C

Local Gravity =

Note Alternatively, you can enter the local manually.

$9.80616 - (0.025928 \times A) + (6.9 \times 10^{-5} \times A^2) - (3.086 \times 10^{-6} \times \text{Elevation})$	
Where	A = cos(2x Position in Radians)

For convenience, FuelsManager allows for the entry of the tank position in deg/min/sec of latitude.

The following is used to convert the position in deg/min/sec to the position in radians.

$$\text{Radians} = \left(\frac{2 \times \Pi}{360}\right) \times \left(\text{Deg} + \frac{\text{Mins}}{60}\right) + \left(\frac{\text{Secs}}{3600}\right)$$

The position of the pressure transmitter is critical to the hydrostatic and hybrid tank calculations since the positions can be affected by the thermal expansion or contraction of the tank. FuelsManager uses the following to correct the installed height of each transmitter for the effects of temperature.

	Corrected Height = Height x [1 + ExpCoeff x (Temp - Installed Temp)}
Where	Height = H_t, H_m or H_b
	ExpCoeff = Thermal coefficient of expansion for the material from which the tank shell is constructed
	Temp = Current product temperature
	Installed Temp = Temperature when the pressure instrument was installed

Both the Hydrostatic and Hybrid methods calculate product density based on the pressure difference between instruments of known heights, as follows.

Hybrid Calculation

	$(D)\ \text{Density} = \dfrac{(P_b - P_t) - (G_l \times (D_v - D_A)) \times \Delta H}{G_L \times (L - H_b)} + D_v$
Where	P_b = Bottom Pressure
	P_T = Top Pressure
	G_L = Local Gravity
	D_V = Vapor Density
	D_A = Air Density
	L = Product level
	H_b = Corrected height of bottom pressure instrument

The calculation for the height DH depends on whether FuelsManager is configured to use a top pressure instrument or not.

If the top pressure is used:	$\Delta H = H_t - H_b$
If the top pressure is not used:	$\Delta H = 0$

Hydrostatic Calculations

$$(D)\ \text{Density} = \frac{(P_b - P_t) - (G_L \times (D_v) - D_A) \times \Delta H}{G_L(H_m - H_b)} + D_V$$

Where	P_b = Bottom Pressure
	P_T = Top Pressure
	G_L = Local Gravity
	D_V = Vapor Density
	D_A = Air Density
	H_b = Corrected height of bottom pressure instrument
	H_m = Corrected height of middle pressure instrument

The calculation for the height ΔH depends on whether FuelsManager is configured to use a middle pressure instrument or not.

If the middle pressure is used:	ΔH = Hm - Hb
If the middle pressure is not used:	ΔH = 0

For hydrostatic calculations, it is also necessary to calculate the level value from the measured pressures:

$$(L_h)\text{Level} = H_b + \left[\frac{P_b - P_t}{P_b - P_m}\right] \times (H_m - H_b)$$

Where	H_b = corrected height of the bottom pressure instrument
	H_m = corrected height of the middle pressure instrument
	P_b = Bottom Pressure
	P_t = Top Pressure
	P_m = Middle Pressure

In addition, FuelsManager provides for the configuration of a level offset to allow you to calibrate the hydrostatically measured level, this is called the Level Offset. The find level is calculated as follow.

$$\text{Level} = L_{off} + L_h$$

Where Loff = Level Offset

Typical Tank Calculation

Analytical and Measured Data

Level (ft-in-16)	12-3-12
Water Level (ft-in-16)	0-9-5
Solids Level (ft-in-16)	0-1-3
%BS&W	0

Level (ft-in-16)	12-3-12
Product Temperature (°F)	75.6
Product Density (lbs /US Gal)	6.8
Density Temperature (°F)	70.8
Standard Density 5 (lbs / US Gal)	6.84
Ambient Temperature (°F)	56.2

Tank Point Configuration Parameters

Volume Correction Method	API °F: Table 6B/5B
Floating Roof Type	Roof Mass Not in Strap
Roof Mass (lbs)	589
Tank Shell Material	Mild Steel (Coeff of Expansion = 1.24 x 10-5)
Tank Insulated	No
Maximum Fill Volume (US Gal)	850,000.00
Minimum Empty Volume (US Gal)	150,000.00

Calculated or Derived Data	**Symbol**	**Action**	**Values Reported (rounded)**	**Units**	**Values used in calculations (unrounded)**
Total Observed Volume [1]	TOV		435,218.32	US Gals	
Water Volume [2]	H20VOL	subtract	189.35	US Gals	
Solids Volume [3]	SOLVOL	subtract	34.12	US Gals	
			434,994.85	US Gals	434,994.8500000000
Correction for Temperature of Shell	CTSh	multiply	1.00016		1.0001640643225
			435,066.22	US Gals	435066.2171353560
Floating Roof Adjustment	FRA	subtract	86.61765	US Gals	86.61764706
Gross Observed Volume [4]	GOV		434,979.60	US Gals	434,979.5994882970
Correction for Product Temperature [5]	VCF	multiply	0.99230		
Correction for %BS&W	BS&W	multiply	1.00000		
Net Standard Volume [6]	NSV		431,630.26	US Gals	431630.2565722380
Available Product (Gross)			285,265.11		

Calculated or Derived Data	Symbol	Action	Values Reported (rounded)	Units	Values used in calculations (unrounded)
Available Product (Net)			283,068.57		
Remaining Product (Gross)			414,849.73		
Remaining Product (Net)			411,655.39		

Notes

1	Quantity derived from tank strapping table using level value to enter table.
2	Quantity derived from tank strapping table (or separate water table) using water level value to enter table.
3	Quantity derived from tank strapping table using solids level value to enter table.
4	Gross volume uncorrected for temperature effects and floating roof adjustment
5	From API Tables 5/6B
6	Net volume corrected to 60 °F

Flow calculations

The following sections detail how FuelsManager performs Flow calculations.

Flow

$$Q = \frac{GOV_{n+1} - GOV_n}{T_{n+1} - T_n}$$

Where:

Q	=	Flow rate
GOVn+1-GOVn	=	Gross Volume change in the sampling cycle
Tn+1, Tn	=	Sample times

Level rate

$$Q = \frac{Level_{n+1} - Level_n}{T_{n+1} - T_n}$$

Where:

Q	=	=Flow rate
Leveln+1-Leveln	=	Level change in the sampling cycle

Q	=	=Flow rate
Tn+1, Tn	=	Sample times

Mass flow

$$Q = \frac{WN_{n+1} - WN_n}{T_{n+1} - T_n}$$

Where:

Q	=	Flow rate
WNn+1-WNn	=	Weight change in the sampling cycle
Tn+1, Tn	=	Sample times

Net flow

$$Q = \frac{VN_{n+1} - VN_n}{T_{n+1} - T_n}$$

Where:

Q	=	Flow rate
VNn+1 -VNn	=	Net volume change in the sampling cycle
Tn+1, Tn	=	Sample times

14 Using Weights and Measures

The Weights and Measures (W&M) function (formerly described in document number MIS-100100-01) provides sealing functionality in the 8130 RTU and FuelsManager products. The system also includes data flow between the various FuelsManager and RTU modules.

This information is included to assist the W&M testing authority, and to ensure the system's data integrity.

This function meets the requirements of Nederlands Meetinsituut (NMi) and Physikalisch-Technische Bundesanstalt (PTB) Weights & Measures (W&M) Agencies. Features included in W&M include the following:

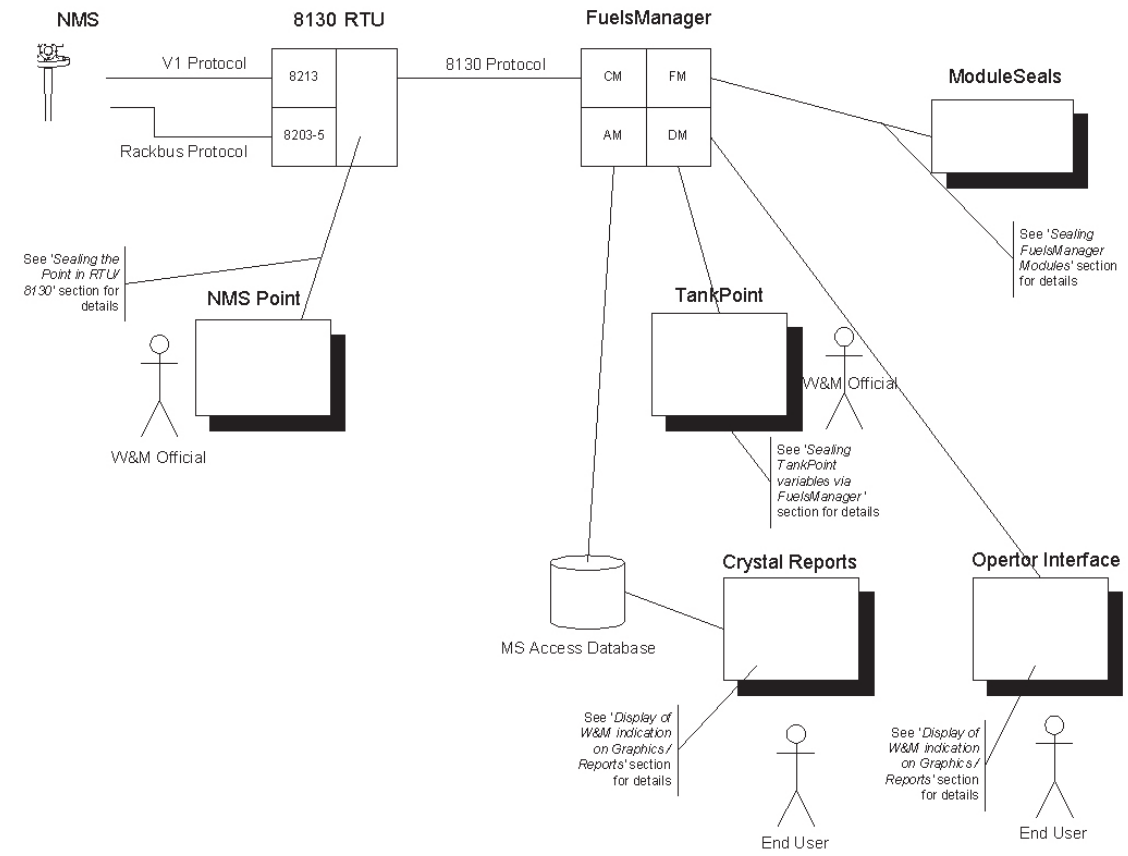
- Sealing of program EXE's / DLL's and report / displays files by W&M official such that if the files are changed in any way the system will not display data in a W&M approved fashion
- A display that lets W&M officials quickly check the installed program elements against the program elements that were approved
- Indicators on all displays when a W&M official has sealed a particular tank variable
- W&M approved displays, to include (at least)

'W&M Approved' indication	Legend of all	
status signs	Engineering units	
Tank Name	Level	Product Temperature
Water Volume	Product	Std Density
TOV	GSV	Mass
Volume Correction Methods	Standard Temperature for Correction Methods	

- Application of calibration seals for individual variables per tank
- Application of calibration seals to tank points in the 8130 RTU
- Ensure that unauthorized modification of system data (both propriety and open databases) is detected and then not displayed as W&M approved

These requirements have been provided for in FuelsManager and the 8130 RTU by Module Seal and Tag Seal features described in the following sections. These features are combined with Microsoft Windows XP/2000 Security to insure the integrity of the data.

System Overview



Sealing the Point in 8130 RTU

The 8130 RTU is configured via a tool called ViewRTU. ViewRTU can communicate with the RTU either local (running on a laptop device) or remotely running via FuelsManager's interface connection.

The ViewRTU configuration tool allows the W&M official to apply a 'software seal' to a particular point. Once this seal is applied all parameters that affect the integrity of the point's data cannot be changed, without removing the seal. Parameters that effect the data integrity are specific to the point type; the table below details this relationship.

Point Type	WMSeal	Parameters Sealed	Parameter Description
E+H FMR 131 Micropilot	No		

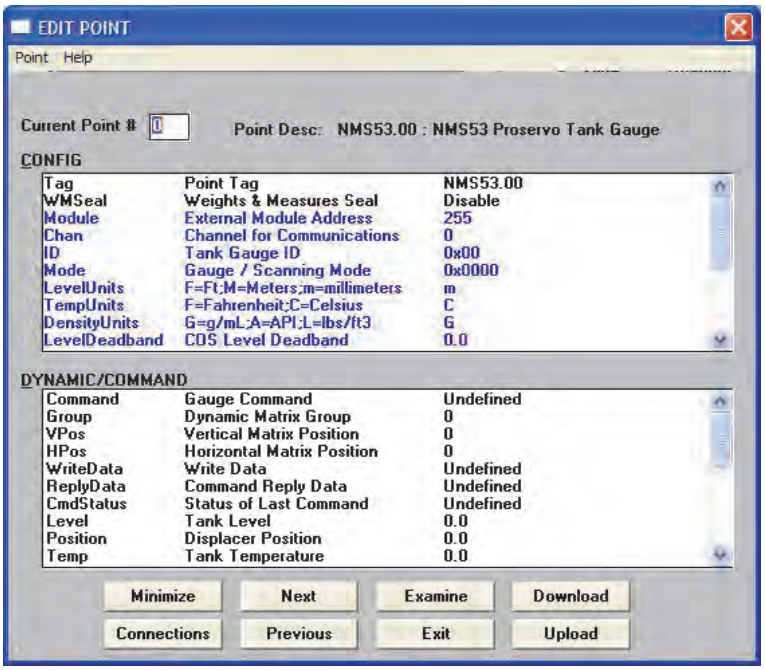
Point Type	WMSeal	Parameters Sealed	Parameter Description
Enraf 811	Yes	Module	External Module Address
		Chan	Channel for Communications
		CIUAddr	CIU Address
		ID	Tank Gauge ID
		TOI	Type of Instrument
		ScanCmd	Scan Commands for Instrument
		LevelUnits	F=ft; M=Meters; m=millimeters
		TempUnits	F=Fahrenheit; C=Celsius.
		LevelDeadband	Change of State (COS) Level Deadband
		TempDeadband	Change of State (COS) Temp Deadband.
Enraf 818 STIC	No		
Enraf 854	Yes	Module	External Module Address
		Chan	Channel for Communications
		CIUAddr	CIU Address
		ID	Tank Gauge ID
		TOI	Type of Instrument
		ScanCmd	Scan Commands for Instrument
		LevelUnits	F=ft; M=Meters; m=millimeters
		TempUnits	F=Fahrenheit; C=Celsius K=kg/m3; A=API; L=lbs/ft3
		DensityUnits	K=kg/m3; A=API; L=lbs/ft3
		LevelDeadband	Change of State (COS) Level Deadband
		TempDeadband	Change of State (COS) Temp Deadband.
Enraf 867 STIC	No		
Enraf 873	Yes	Module	External Module Address
		Chan	Channel for Communications
		CIUAddr	CIU Address
		ID	Tank Gauge ID
		TOI	Type of Instrument
		ScanCmd	Scan Commands for Instrument
		LevelUnits	F=ft; M=Meters; m=millimeters
		TempUnits	F=Fahrenheit; C=Celsius
		LevelDeadband	Change of State (COS) Level Deadband
		TempDeadband	Change of State (COS) Temp Deadband.

Point Type	WMSeal	Parameters Sealed	Parameter Description
GSI Model 2000	No		
ITT Barton 3500	No		
L&J MCG1000	No		
L&J MCG1500	No		
L&J MCG2000	No		
NMS53	Yes	Module	External Module Address
		Chan	Channel for Communications
		ID	Tank Gauge ID
		Mode	Controls operation of this point. Model 8203: Reserved for future use Model 8213: 0x8000: MDP Protocol 0x4000: DX Protocol 0x0004: Change Contacts 0x0002: Ignore S Command 0x0001: Ignore R Command
		LevelUnits	F=ft; M=Meters; m=millimeters
		TempUnits	F=Fahrenheit; C=Celsius
		DensityUnits	K=kg/m3; A=API; L=lbs/ft3
SAAB L/2 Radar	Yes	Module	External Module Address
		Chan	Channel for Communications
		ID	Tank Gauge ID
		LevelUnits	m=millimeters; s=sixteenths
		LevelConvert	Convert Level to standard
		LevelDeadband	Change of State (COS) Level Deadband
Tank Side Monitor	Yes	Module	External Module Address
		Chan	Channel for Communications
		ID	Tank Gauge ID
		BaudRate	Baud Rate Data bits & Parity
		ComParams	Operating Mode
		ModeLevel Deadband	Change of State (COS) Level Deadband.
		Temp Deadband	Change of State (COS) Temp Deadband
Sakura Level Transmitter	No		
TankPoint	No		
TI-111	No		
TI-121	No		
TI-150	No		
Tokyo Keiso FM9000	No		

Point Type	WMSeal	Parameters Sealed	Parameter Description
Veeder Root TLS-350	No		
Whessoe Bus 2046	No		
Whessoe Bus ITG	No		
Whessoe Varec 6500	No		
Whessoe Varec ATT4000	No		
Whessoe Varec MFT 4100	No		
WV1900	No		

Applying the Software Seal

Parameters that are effected by the application of a software seal are shown in an alternate color.



1. Double-click the WMSeal parameter in the CONFIG section of the Edit Point dialog.
2. If prompted for a password, then the WMSeal value is currently Disabled. Enter the W&M password.
3. If prompted with an Update Seal dialog asking for confirmation, then the WMSeal value is currently Enabled. Click Yes to confirm.
4. After entering the W&M password or clearing the seal, a Modify Value dialog is appears.
5. Change the value of the WMSeal parameter.

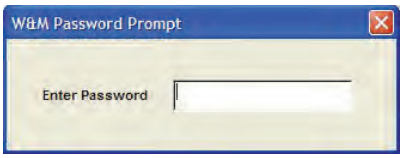


Figure 14-1: W&M Password prompt

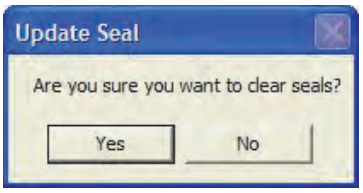


Figure 14-2: Update seal confirmation

Once the point is sealed the parameters that could affect the data integrity are disabled and cannot be modified without removing the seal. Any attempt to edit one of these parameter results in a error message box informing you that the W&M Seal is Enabled for this point. All ViewRTU point displays indicate the disabled status in the same manner.

Figure 14-3: ViewRTU spreadsheet mode

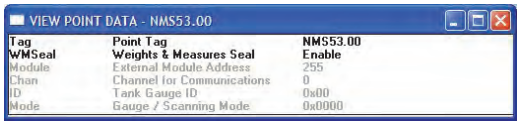


Figure 14-4: ViewRTU Edit Point Data

W&M Checksums

In order for the W&M official to verify that the sealed point has not been tampered with, the 8130 RTU calculates a WMChecksum for all points that have a WMSeal parameter. This WMChecksum is calculated by performing a CRC16 on all the point parameters that can affect the data integrity. Users can make changes to other point parameters without affecting the WMChecksum value.

In order to allow the W&M official to easily view the WMChecksum values for all the sealed points, ViewRTU includes a 'View Weights & Measures List…' menu option under the Options menu item. This opens a 'Weights and Measures List' dialog displaying all points in the 8130 RTU, their WMSeal statuses and the WMChecksum value.

W&M Seal Communications

The status of the WMSeal parameter is communicated to FuelsManager via the PntStatus parameter in the particular RTU point. The bit position of the WMSeal information is specific to

the particular point type. FuelsManager automatically knows which bit position contains the WMSeal information.

FuelsManager combines this WMSeal information from the 8130 RTU with its own W&M Seal information in order to determine if the particular data value is W&M approved.

Sealing TankPoint variables in FuelsManager

The FuelsManager Tank Database includes Tag Seal Data for each tank. The Tag Seal Data includes a seal for the Tank, a seal for each input Process Variable, and an integer Seal ID that denotes the revision of Tank Seal Data. The Tank Database is stored in file FM_TankPoint.dat in the FuelsManager project directory. FM_TankPoint.dat is a proprietary database file and is only accessible through FMDataManager.exe. Library Tnkcnfg.dll is the Tank Configuration client component of FuelsManager and includes the Edit Tank Data dialog.

Applying the Software Seals

Tank seals can be configured from the W&M tab of the Edit Tank dialog in Configuration.

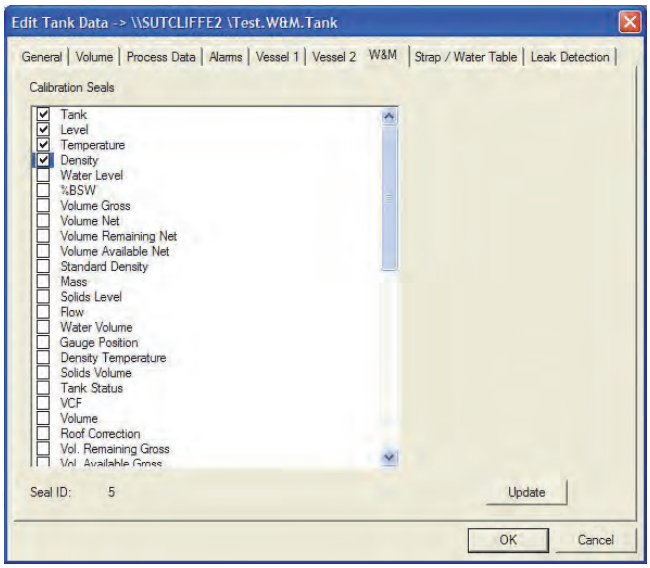


Figure 14-5: Edit tank data—W&M tab

Changing a Seal State for a Process Variable

A checkbox indicates the state for the Tank Seal and each input Process Variable Seal. A check mark means that the state is sealed.

1. Make the change by checking or clearing the appropriate checkbox under Calibration Seals. The Update Seals button becomes available. This happens when any Seal State checkbox is changed.
2. Click Update Seals. A prompt appears to confirm the changes.
3. Click OK. If any Seal State changes are checked, a prompt appears to enter the Weights & Measures password. Otherwise the prompt is simply for confirmation.
4. Enter the password. The Weights & Measures password must be properly entered to effect setting Tag Seals.

Figure 14-6: Password prompt

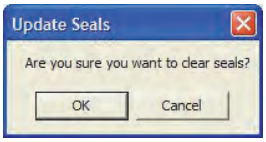


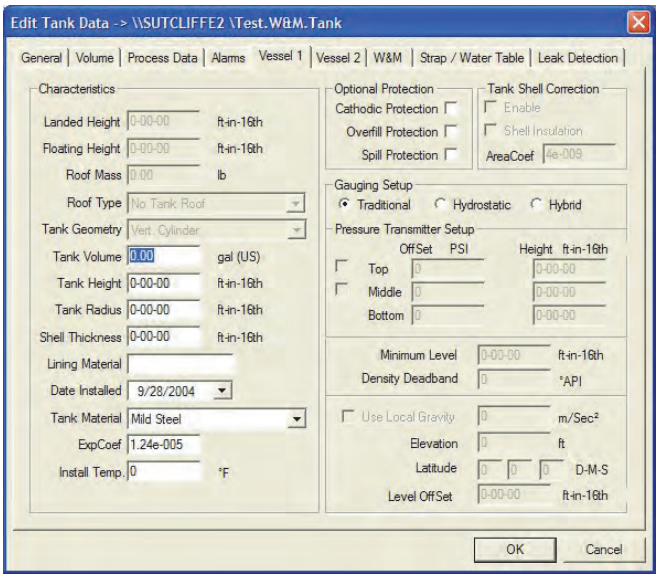
Figure 14-7: Update seals confirmation

Each time the Tank Seal Data is changed, the Seal ID is incremented. This Seal ID will be recorded by the W&M official.

If someone learns the W&M password and makes changes to the Tag Seals, the Seal ID will be incremented and no longer match the Seal ID recorded by the W&M official. In this manner the W&M official is able to detect unauthorized tampering with the Tag Seals.

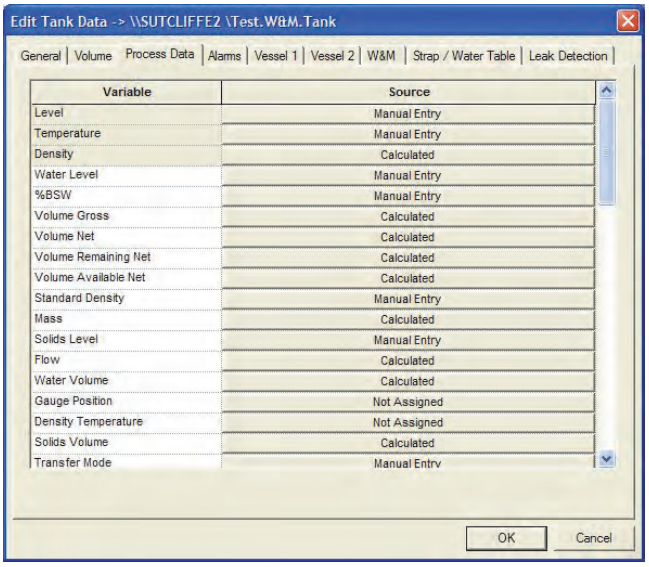
When a Tank is sealed, you cannot configure or edit any process variable scaling, engineering unit, volume correction, vessel characteristic, vapor characteristic, or strap table parameters.

In this example of a sealed tank, W&M keeps any users from editing the sealed information.



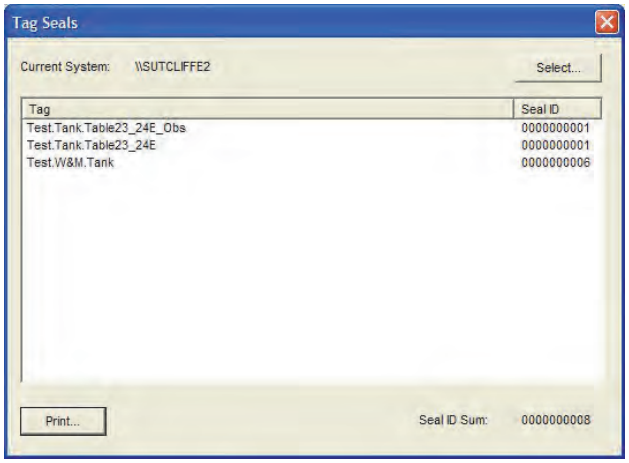
When an input Process Variable is sealed, configuration of the Process Variable data source is disabled. This feature ensures that a user cannot connect the sealed process variable to another 8130 RTU point.

In this example, Level, Temperature and Density are sealed, and cannot be edited.



To aid the W&M official in verifying which FuelsManager tank points have a seal applied, and what the value of the Seal ID is, FuelsManager includes a Tag Seals dialog.

In this example, three tanks have been sealed or contain sealed variables.



The Tag Seals dialog shows the Current System and all the Tanks contained in the FuelsManager Tank Database for the current system that have either Tank or Input Process Variables sealed. The Dialog shows the Tag, the Seal ID and the sum of the Seal ID's.

Display of W&M Indicator on Graphics & Reports

The FuelsManager Operate program indicates any Weights & Measures Seal for Tank Detail and Historical Report displays. The Weights & Measures Seal is shown by the prefix [W&M] on the title bar of the display.

If a particular tank process variable has been sealed, FuelsManager displays or prints values with the subscript "W&M." This is determined by the Input Process Variable Seal and, if applicable, an I/O Seal that is communicated from the external device. An illustration of the "W&M" seal indication is provided below.

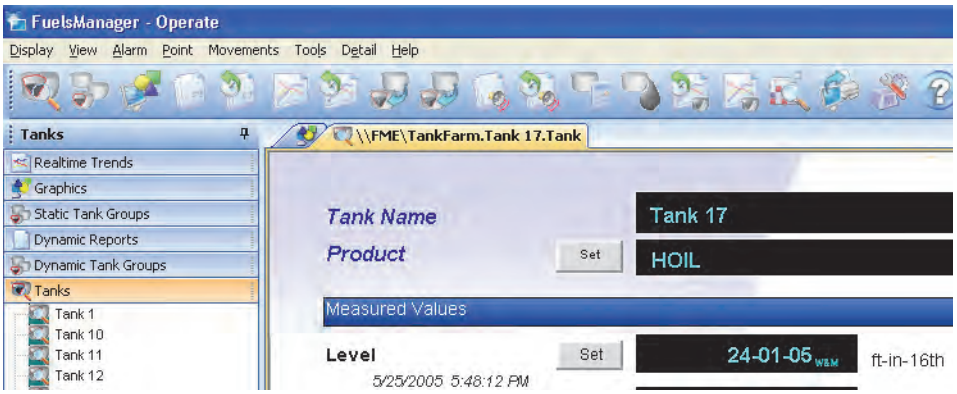


Figure 14-8: FuelsManager Operate - Level field showing W&M indicator

Any FuelsManager user-defined reports will include W&M indicators. The system checks the database for the Seal and displays the subscript if applicable. The indicator appears at the footer of each report page.

Sealing FuelsManager Modules

FuelsManager includes a Seals database. This database exists on each computer in a FuelsManager network and is stored in the FMSecurity.dat file under the FMProject directory. For each module in the database, the system stores the Path, a CRC16 Checksum (determined at the time the module is sealed), and a Seal State that indicates whether the module is or is not sealed. Access to the Module Seals Database is provided through the FMSecurityServer interface of FMSystemServer.exe.

W&M officials can administer Module Seals in FuelsManager from Security. The Module Seals dialog shows all the modules contained in the Module Seals database for the Current System. Modules can be added and removed.

The dialog shows the following for each module:

• Seal State	• Path
• File Size	• Time of Last Modification
• Version (if applicable)	• Current Checksum
• Stored Checksum	

Items under the Actions menu provide for the addition and deletion of modules from the database.

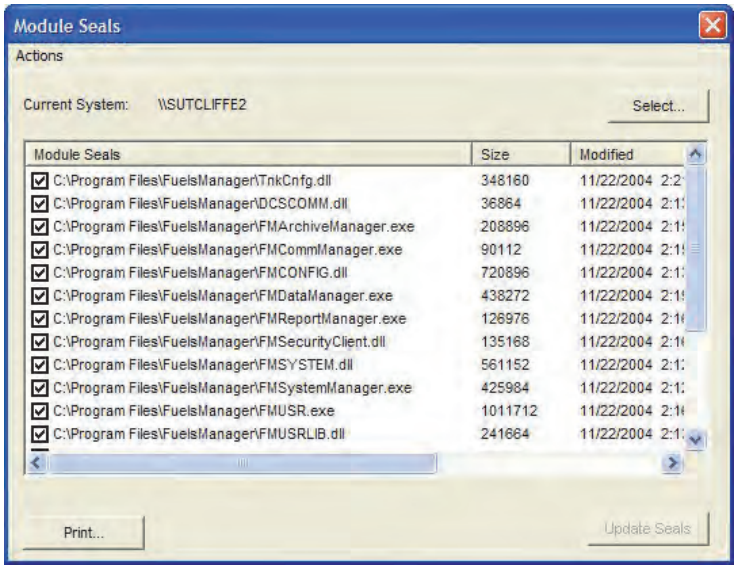


Figure 14-9: Module Seals dialog—available in Security

A checkbox shows the Seal State for each module. A check indicates the module is sealed, while an unchecked box indicates no current seal is applied.

Changing a Seal State for a module

1. In Security, Click Module Seals from the W&M menu. The Module Seals dialog appears.
2. Click the checkbox that corresponds to the module you want to change. The Update Seals button becomes available.
3. Click Update Seals. A prompt appears to confirm the changes.
4. Click OK. If any Seal State changes are checked, a prompt appears to enter the Weights & Measures password. Otherwise the prompt is simply for confirmation.
5. Enter the password. The Weights & Measures password must be properly entered to modify the Tag Seals.

W&M Logic

The following is a summary of the logic used when checking the Weights & Measures seals. Sealed modules that are changed in any way in the system will not appear with the W&M approval indicator.

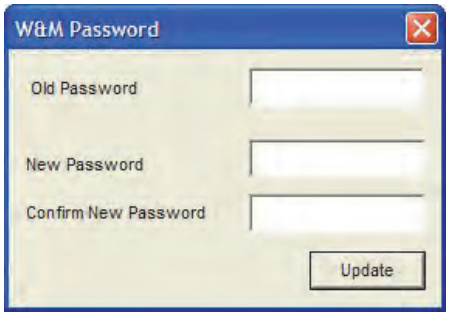
The module seals are read when the particular module is started and loaded. So any changes in W&M seal indication will only be effective when the module is restarted/reloaded.

- FMCommManager. – will mark data as sealed if both the driver library and FMCommManager.exe modules are sealed. Specifically for the 8130 RTU the files cmdc8130.dll and the cmds8130.dll, in addition to the RTU point, must also be sealed.
- FMDataManager – will mark data as sealed if the FMDataManager.exe module is sealed and the process variable is sealed for the respective Tag. If the process variable is calculated, then the VolumeCorrection.dll library module must be sealed. If the process variable is an input from FMCommManager then the data must also be sealed by the driver.
- FMArchiveManager – will mark data in the archive as sealed if the FMSystem.dll library, the DCSComm.dll library and FMArchiveManager.exe modules are sealed and the data is sealed by FMDataManager.

- FMOperate will display data as sealed on graphics, tank details and real-time trends if the FMSystem.dll library, the DCSComm.dll library and OperNT.exe modules are sealed and the data is sealed by FMDataManager.
- FMOperate will display data as sealed on historical trends if the FMSystem.dll library and OperNT.exe modules are sealed and the data is sealed in the archive.
- FMOperate will display data as sealed in historical reports and historical trends if the FMSystem.dll library and OperNT.exe modules are sealed, the data is sealed in the archive and the Archive.mdb file is still owned by the SYSTEM. In addition, for the historical reports, the Crystal report must have been designed to display W&M seals using custom functions supplied in the U2FM.dll, which must also be sealed.
- RMClient will display data as sealed on reports if the FMSystem.dll library, the DCSComm.dll library, and the RMClient.dll modules are sealed and the data is sealed by FMDataManager.
- FMReportManager will print data as sealed on real-time reports if the FMSystem.dll library, the DCSComm.dll library, and FMReportManager.exe modules are sealed and the data is sealed by FMDataManager.
- TankGroup will display data as sealed on tank group displays if FMSystem.dll library and TankGroup.dll library modules are sealed and the data is sealed by FMDataManager.

Setting the W&M Password

To set the W&M password, you must know the existing W&M password.



The same W&M password is used for:

- Tag Seals in FuelsManager
- Module Seals in FuelsManager
- WMSeal enable in 8130 RTU

1. From Security, select Password from the W&M menu. The W&M Password dialog appears.
2. Enter the Old Password.
3. Enter the new password twice—once in New Password, and again in Confirm New Password.
4. Click Update.

Systems Seals

To ensure the integrity of the FuelsManager historical data, FuelsManager makes use of Windows XP & 2000 folder, file and object-based security. All system data stored in open format databases is configured with file security settings. The System account has ownership, read, and write access, while all other accounts have only read access.

FuelsManager services that write system data run under the System account thereby providing write access to all users but only in accordance with the FuelsManager Security configuration.

The FuelsManager application allows the W&M official to seal any open format database, specifically the historical data stored in the Archive.MDB file (an MS Access database). This sealing process is protected by the same W&M password and integer seal ID mechanism used in the Module and Tag seals dialogs.

The process of sealing an Archive.MDB file sets the permissions on the file to:

- Everyone – Read / Execute
- System – Full Control

In addition, ownership of the file is set to System

In order for any user (administrator included) to make changes to the security of the file they would need to take ownership of the file. If the archive is sealed FuelsManager checks the ownership of the file whenever access to historical data is required. If the ownership of the archive file is not System, then the data does not appear as W&M approved.

15 Administering Reports

Report

The Report application lets you create and edit reports as well as specify print times and print intervals. Once created, the reports can be opened in the Operate program. The active report prints at its scheduled time, even if the Operate program is not opened.

> Note The Report feature is only available in the FuelsManager Professional Edition or the FuelsManager Server Edition. The FuelsManager Standard Edition will not allow access to this feature. For additional information about upgrading to the FuelsManager Professional Edition or the FuelsManager Server Edition, please contact your Varec representative.

In Operate, opened reports displaying real-time data from the database you selected can be printed on-demand or schedule them to print automatically.

You can create two types of reports:

- The Summary report - displays the only Tank point information found in one or more databases.
- The Dynamic report - displays all types of points: Tank, Input, Output, and Triggered points as defined by the report creator.

Make sure the DataManager is not in SHUTDOWN mode. You will not be able to access the database windows used to define values if the DataManager is in SHUTDOWN mode. The DataManager must be in STANDBY or ACTIVE mode.

Opening Reports

1. From FuelsManager Configuration, User Interface menu select the Create Reports command.
2. The Report Editor window appears.

Exiting Reports

1. From the Report Editor window, click File.
2. Select Exit.

Predefined standard reports

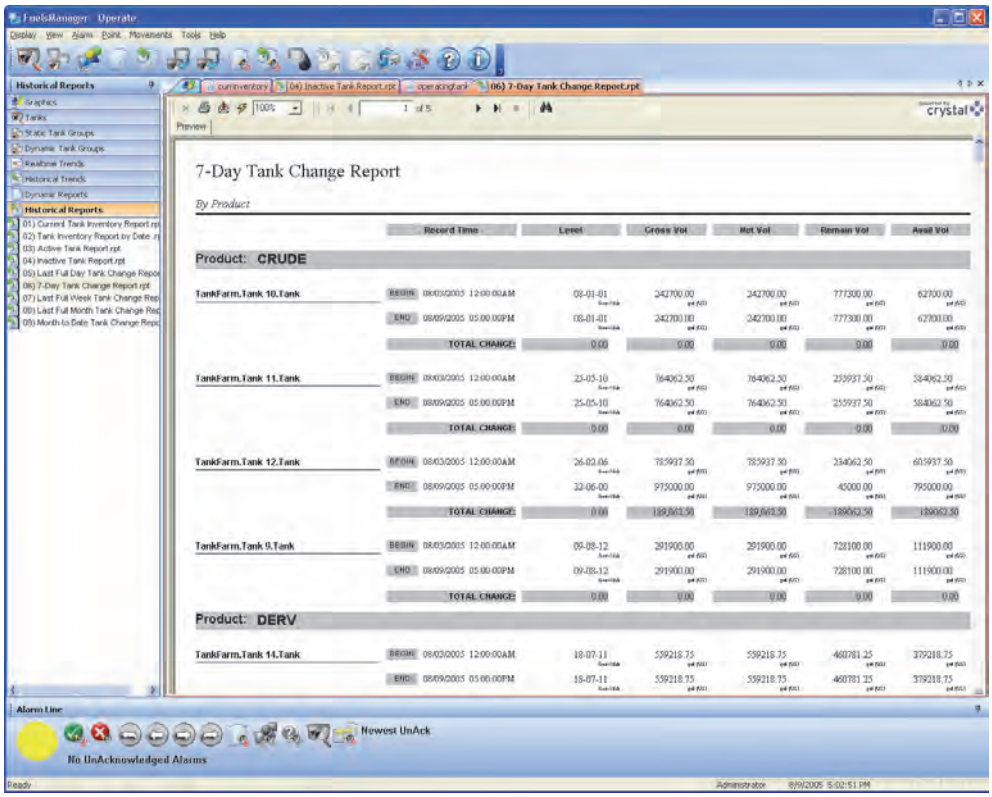
FuelsManager has provided several defined reports used to display standard tank information that reflect common facility needs. These can be edited to conform to the facility or used as a guideline.

> Note All of FuelsManager's standard reports are Summary reports.

These reports include the Inactive Tank, Active Tank, Operating Tank, and Current Tank Inventory reports. These standard reports are listed and described below:

Standard Report	Description
Inactive Tank Report	Displays information about all inactive tanks in the system.

Standard Report	Description
Active Tank Report	Displays information about all active tanks in the system.
Operating Tank Report	Lists all tanks known to the system.
Current Tank Inventory Report	Groups the data by product. Also displays level, temperature, gross volume, net volume and remaining volume data. Totals for gross volume, net volume, and remaining volume are given for each product.



Tools and objects for reports

A report can contain tables, data (values) used to represent real-time data points, and labels used and identify the values. Additional items that can be found in a report include column and row totals and averages. These components are described below.

Tables

FuelsManager provides the capability to display information in a Tabular format. You can create tables as well as edit and delete tables. Some editing techniques include sizing the table, defining the number of rows and columns, inserting/deleting columns, and moving the table.

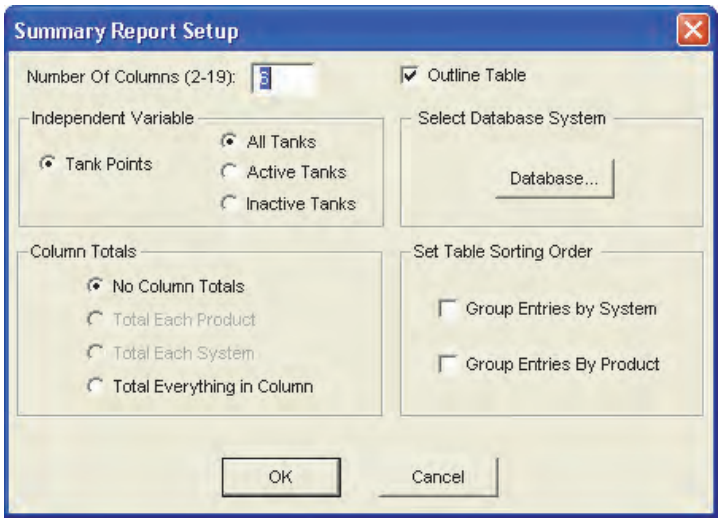
Labels

A Label is text used to identify values.

Creating label attributes includes entering the label name, selecting the appearance, and positioning the label. You can select the label size, font, and style.

Values

A Value represents real-time data connected to a database. Creating values include selecting a database and corresponding points and variables. This procedure used to create values is the same procedure used in the Draw application.



In addition to selecting a database, point, and point parameter, other attributes include font appearance, positioning, field width, precision, and engineering units. These attributes are set in the Database Value Attributes window displayed during value creation.

You have the ability to customize or automatically set the field display. Field Width is the number of characters allowed for the value. Precision is the allotted number of decimal places if the value is numerical. You can also convert to new engineering units, if necessary.

The attributes also include font appearance and positioning. You can select the value size, font, and style. The table Snap option is enabled for aligning the value if the Snap to table option (under the table menu) is checked.

Variables are parameters of a point such as time, temperature, and density. A single point can have multiple variables. For example, a point is defined as Tank Farm A. Tank 22. Tank Point. The variables associated with the Tank Point may be temperature,% sediment, and tank level.

The variables available for Input and Output points are different from those available for Tank points. Some examples of Tank point variables include temperature, level, and density. Input and Output point variables may include an alarm status or process value.

For a complete listing of point parameters, refer to the Glossary.

Column/row totals and averages

You can display column/row totals or averages in a report. Values in a column can be totaled all together or individually for each product or database system.

Summary reports

A Summary report acts like a spreadsheet. The first column lists all the Tank points (active, inactive, or both) and corresponding databases. These points can be grouped by tank product or by database system. The remaining columns list point variables, such as level and density. You can select what variables the report displays.

Object Functions in summary reports

Object	Summary Report Functionality
TABLE	Exactly one table is required.
# OF ROWS IN TABLE	The FuelsManager database sets the number of rows. User cannot enter a number.
LABELS	Can only be inserted in the first row as report column headers.
VALUE	The first value entered in the table establishes, or tags, the databases to which the Tank points will be derived. Each subsequent value created represents the selected variables of one or more Tank points such as temperature and density.
COLUMN/ROW TOTALS AND AVERAGES	Only column totals and column averages can be displayed

Creating a new summary report

1. Within the Report Editor window, from the file menu, select New, and then select the Summary Report command from the sub-menu.
2. The Summary Report Setup window appears. In the Summary Report Setup window, set the specifications of the Summary report. The components of the window are described below.

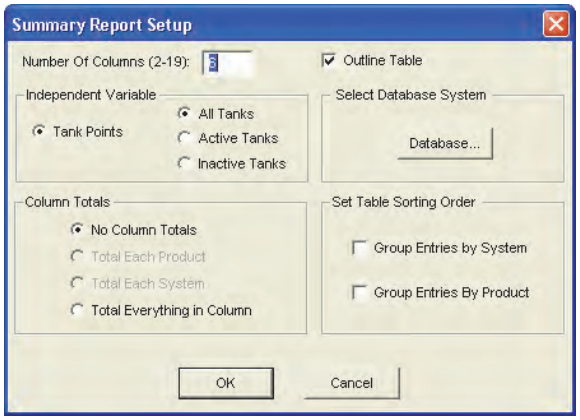


Figure 15-1: Summary Report Setup window

Summary report Setup window	
In the Number of Columns	Type in a number from 2 to 19. This option is also available when creating a table.

Summary report Setup window	
The Independent Variable	This option designates which tanks are to be displayed in the report--All Tanks, Active Tanks (Tank Mode is not stopped), or Inactive Tanks (Tank Mode is stopped).
Select Database System	Click Database to select which databases are to be included in the report. One or more databases can be selected.
Set table Sorting Order	In the Set table Sorting Order section, select an option to group Tank point entries. The entries can be grouped alphabetically and numerically by database systems, by products or both. If both the system and products are selected, the points are grouped by system with products nested inside each system.
Column Totals	In the Column Totals section, you selects how to display column totals of each numerical point variable. The default setting is no totals. If one or both of the table Sorting/Grouping buttons are chosen, you have the option of displaying the total for each product or database system. If a total option is selected, three rows appear in the table. If the "No Column Totals" option is selected, only two rows appear in the table.
Outline table	Selecting the Draw Outline table checkbox displays a table outline when the report is printed or viewed in Operate.

Note The Select Database System window appears upon exiting the Summary Setup window if databases were not selected. After the database or databases are selected, you are automatically placed in table creation mode.

Creating a table in a summary report

Since a Summary report is of a spreadsheet format, only one table is required.

1. Do one of the following:
   a. If you are not in table creation mode, select Edit, click Add, and click Table and the Tabular Format window opens.
   b. Click where you want the table to be placed to open the Tabular Format window.
2. The Tabular Format window, shown below, allows you set the number of rows and columns in the table, as well as the dimensions of the table cells.
3. Type in the number of columns that you want in the table.
4. Type in the dimensions of the table cells (inches in width or height), or select auto sizing.
5. Click OK.

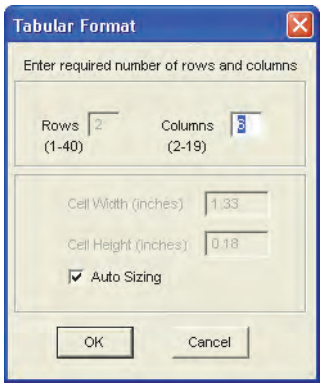
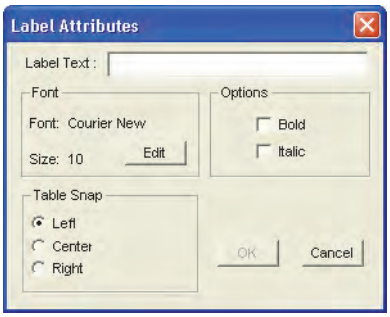


Table Format window	
ROWS	Either a 2 or 3 appears for a Summary report. The first row is reserved for labels, the second for values, and the optional third for column totals. This number can only be changed in the Summary Report Setup window.
COLUMNS	You can type the number of columns, with a maximum of 19. The table appears from margin-to-margin if the autosizing option is selected. This option was also defined in the Summary Report Setup window. The defined number appears in the edit box; change only if needed.
AUTOSIZING	Deselect this option if you want to enter the table cell dimensions manually, when checked, all cells will be equal in width and stretched from margin to margin. The allowable space can not exceed the page width minus the margins.

Creating labels in a summary report

Labels can only be added to the first row of a Summary Report.

1. Select Edit, click Add, and click Label.
2. Click on the cell where you want the label to be placed. Only the cells in the first row can be selected for a summary report.
3. The Label Attributes window appears. In this window, enter the label name. An Edit button is available to format the appearance of the label. The table Snap option buttons aligns the label within a cell.
4. Enter the text in the Label Text edit box.
5. Click Edit to format the font appearance of the label. These changes can be made before or after the text has been entered in the Label Text edit box.
6. Align the label by selecting the appropriate option button. This option only applies to labels placed in the table with the Snap to table option selected (in the table pull-down menu).
7. Click OK. A label appears in the selected area.



Creating values in a summary report

When creating a value for a Summary report, the first step is to establish the Independent Variable for which all the database points will be derived. Then select the point variables to be placed in the remaining columns. In runtime, the points and corresponding database are listed in the first column. The remaining columns contain variables such as level and temperature.

Refer to the Summary Report Summary window (displayed from the Report Menu) to review the defined specifications, if necessary. Refer to the Values section for an elaborate description.

1. Select Edit, click Add, and click Value.
2. Click on the first column cell in the second row.
3. The Database Value Attributes window appears.
4. The Database Value Attributes window allows you to set the appearance, field width, and positioning of the Independent Variable. The Independent Variable, or tag, cannot be changed from this window. The databases were selected earlier in the Summary Report Setup window. In runtime, the database points assume the Independent Variable's appearance attributes.
5. Click OK when complete. "Example Database Point Tag" appears in the selected cell. (This step only occurs once per report).
6. Click on the next column cell in the second row. The Select Point Variable window appears.
7. Choose the desired point variable and then click Select. The Select Engineering Units window appears if the point variable is numerical. At this time, the engineering units to be displayed are undefined. (To view a complete list of engineering units, refer to the Shared Systems Resources documentation).
8. Select the corresponding engineering unit. Click Select. The Database Value Attributes window appears.
9. Select the attributes of the point and then select OK. The value appears in the selected cell.

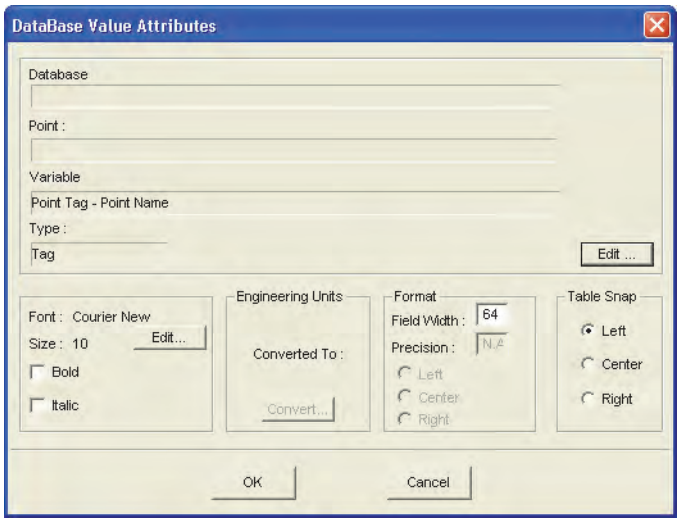


Figure 15-2: Database Value Attributes window

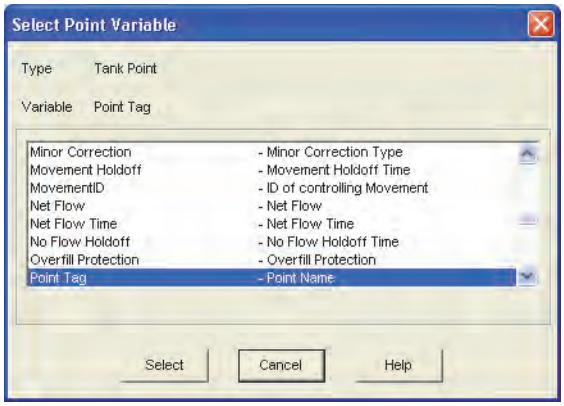


Figure 15-3: Select Point Variable window

After the Independent Variable has been defined, the remaining columns can be filled with Tank point variables such as temperature, level, and volume.

After all values have been entered, you have the option of displaying column totals. If not, the next step is to save and generate the report for viewing in the Operate program. Refer to the Saving Reports section. If any editing needs to be done, refer to the Editing Reports section.

Creating column totals

You can display grand column totals, or totals for each product or database system. If only two rows are displayed in the table, return to the Summary Report Setup window to select a column totals option. This window is found under the Report menu.

1. Select Edit, click Add, and click Summary.
2. Click on cell where you want the total to be placed. The Row/Column Summary window appears. Clicking Edit allows you to modify the column total appearance.
3. Click OK. A number appears in the selected cell.

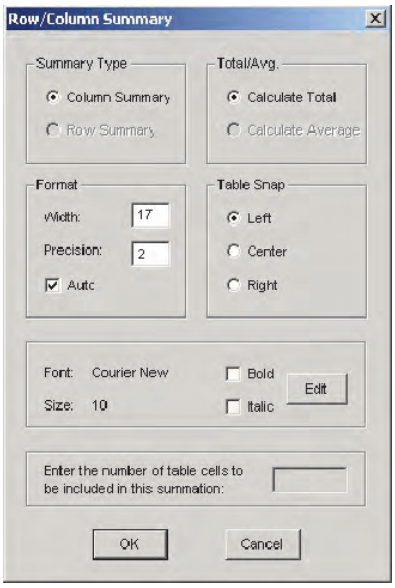


Figure 15-4: Row/Column Summary window

Dynamic reports

A Dynamic report is more flexible than a Summary report. You can select points and corresponding variables from any active database and add them to the report. You are also not restricted to a certain format. You can use as many tables as you like or no tables at all. Unlike Summary reports that list all the points found in a selected database, Dynamic reports can contain any number of individual database points. You can also display multiple column/row totals and averages.

Object Functionality of dynamic reports

OBJECT	Functionality in Dynamic Reports
TABLE	No tables, one table, or multiple tables can be created
# OF ROWS IN TABLE	Defines the numbers of rows to be included in a table
LABELS	Can be inserted outside or inside a table
VALUE	User can select an individual point (Tank, Input, or Output) of any active database. Only one database can be selected at a time
COLUMN/ROW TOTALS AND	Can display column totals, column averages, Averages as well as row totals and total averages. Can also contain multiple averages/totals

Creating a new dynamic report

By default, the Report program is placed automatically in the Dynamic Report mode. Make sure that the Dynamic Report option is selected.

1. From the Report Editor window, select File.
2. Select New, and then select Dynamic Report option.

3. At this point, you have the freedom to create the contents of the Dynamic report. Listed below are procedures used to create tables, labels, values, column/row totals (and averages), and pages. As mentioned earlier, you have the option of using one or more tables to display database point data.

Creating tables in a dynamic report

1. If you are not in table creation mode, select Edit, click Add, and click table or...
2. Click where you want the table to be placed to display the Table Format window; otherwise
3. In the Tabular Format window, you can set the number of rows and columns in the table as well as the dimensions of the table cells. These options vary between types of reports; the differences are noted below.
4. Type in the number of rows and columns as well as the dimensions of the table cells or select Auto sizing.
5. Click OK.

Creating labels in a dynamic report

1. Select Edit, click Add, and click Label.
2. Click where you want the label to be displayed. This can be within a table or no.
3. The Label Attributes window appears.
4. In the Label Attributes window, enter the label name. An Edit button is available to format the appearance of the label. The table Snap option buttons aligns the label within a cell.
5. Enter the text in the Label Text edit box.
6. Click Edit to format the font appearance of the label. These changes can be made before or after the text has been entered into the label text edit box.
7. Align the label by selecting the appropriate option button. This option only applies to labels placed in the table with the Snap to table option selected (in the table pull-down menu).
8. Click OK. A label appears in selected area.

Creating values in a dynamic report

When creating a value for a Dynamic report, only individual points are used. The process involves selecting a default database, selecting the point, and then selecting the corresponding point variable. All types of points can be used in a Dynamic Report Input, Output, Triggered, and Tank points.

1. Select Edit, click Add, and click Value.
2. Click where you want the value to be displayed. This can be within a table or not.
3. Select a point from the Database Edit window to be represented by the value.
4. Click Select. The Select Database Point window appears.
5. Make appropriate selections and click OK. The Select Engineering Units window appears if the point variable is numerical. For a complete list of engineering units, refer to the Glossary.
6. The Database Value Attributes window appears.
7. Click OK when the appearance, formatting, and positioning of the value have been completed. The value appears in the selected area or cell.

Creating totals and averages

After all values have been inserted, you have the option of displaying totals or averages at the bottom of a column or at the end of a row. You can insert multiple column averages and totals; however, total or averages cannot be used outside of a table.

1. Select Edit, click Add, and click Summary.
2. Click on the cell where you want the total to be displayed. The insertion can exist in any cell at the end of a row, column, or any cell in-between as long as there are cells to total or average. The Row/Column Summary window appears.
3. Click either the Column Summary or the Row Summary option button to select a row or a column summary. Click either Calculate Total or Calculate Average option button.
4. Type the number of cells to include in the summation or average. This number includes the cells to the left in a row or the number of cells above the insertion point. Entering this number allows for more than one total average to display. The number excludes the cell containing the total or average.
5. Click OK.

   A value appears in the selected cell.

Adding pages

This option applies exclusively to Dynamic reports since the number of pages in a Summary report is undefined.

1. Select Page from the menu bar and click one of the following options: Append or Insert Page Before Current Page.
2. Select Append to add a page to the end of the report.
3. Select Insert Page Before Current Page to add a page before the current page.

Once a page has been added, more tables, values, and summaries can be placed onto the page just created.

Deleting pages

You can delete a page in Dynamic reports. All data that is on the page will be removed completely.

1. Select the page that is to be deleted.
2. Select Page from the menu bar and click on Delete Current Page.

Maneuvering through pages

The Page menu applies only to Dynamic reports. This option allows you to add pages to the report and to maneuver through the report pages.

1. Select Page from the menu bar and click on Next, Previous, First or Last.
2. Select Next (or press <Page Up>) to maneuver to next page.
3. Select Previous (or press <Page Down>) to maneuver to previous page.
4. Select First (or press <Home>) to maneuver to first page.
5. Select Last (or press <End>) to maneuver to last page.

Formatting reports

Summary and Dynamic reports can have the default font, report layout, headers, and footers defined.

Setting the default font

1. Select Format and click Font. The Select Text Font window appears.
2. Select the type of font, size, and attributes for the default font setting.
3. Click OK when completed.

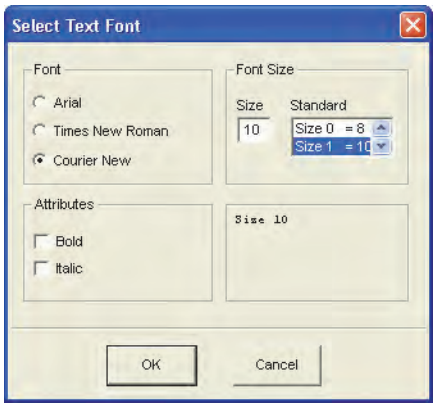


Figure 15-5: Select Text Font window

Setting the report layout

1. Select Format and click Report Layout to display the Report Layout window.
2. Set the margins in inches. The report header and footer will adhere to the top and bottom margins if they are defined.
3. The Paper Type option allows you to select either a legal (81/2 x 14 inches) or letter (81/2 x 11 inches) setting.

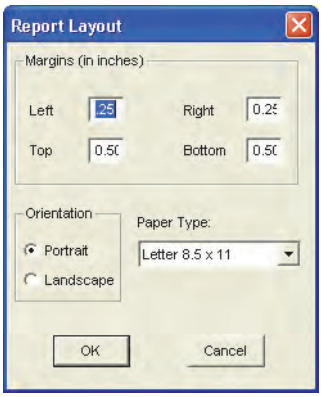


Figure 15-6: Report Layout window

Setting the headers and footers

The report header and footer appear on every report page inside the set margins. The Edit Font button sets the header font appearance. The footer font assumes the header's attributes, but the font size remains at a fixed 10-point size. These attributes are applied before or after the header is entered.

The date and time appear in the bottom left corner of the first page. The page number, “Page #”, appears in the bottom right corner. Its font attributes are the same as the header and footer fonts but at a fixed 10-point size.

1. Select Format and click Headers and Footers.
2. Select Edit Font to change the font for the header and footer. The header and footer can have different font types.
3. Select OK when completed entering all information.

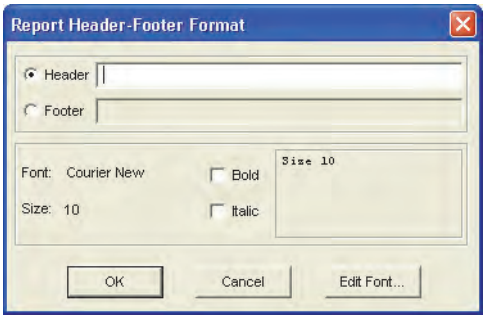


Figure 15-7: Report Header Footer Format window

Setting print times and report status

In the Printer list box, assign a default printer to the selected report. The selected printer can only be changed in the Report Editor window.

1. Select Format and click Report Details.
2. Select the print status, printer, and type in the time and file name.
3. To configure a report to print periodically, enter the number of minutes between print times in the print interval field. In addition, enter the number of minutes past the hour that you want the print interval to synchronize to in the Print Time field.
4. To configure a report to print at a particular time of day, enter the required time in the Print Time field.
5. If the print time is midnight, type in “24:00” instead of “00:00”.
6. The Print Status section allows you to set the initial print status. The Inactive option keeps the report from printing. In Operate, the operator is able to enable an inactive report. An Active report will print at its designated time once the file is saved and generated. The report does not have to be opened in the Operate program, nor does the Operate program have to be active, in order for it to print at its scheduled time.
7. Select OK when completed.

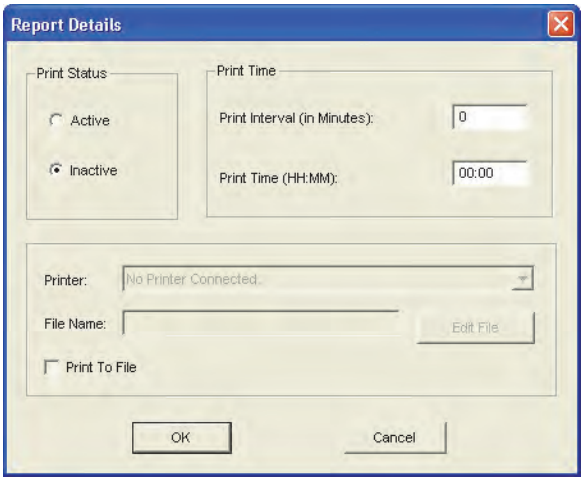


Figure 15-8: Report Details window

Editing reports

FuelsManager enables you to edit reports of both categories - Dynamic and Summary. Any item that was created in the reports can be edited such as labels, values, and tables as well as report formats and print times.

After a report is edited and the changes are saved, it is necessary to regenerate the report so the changes appear when printed or displayed in the Operate program.

Opening an existing report

1. Select File from the Report Editor menu bar and click Open.
2. Select the desired report.
3. Click OK. The report is displayed in the Report window.
4. Editing FuelsManager standard reports.

Since all of FuelsManager's Standard reports are Summary reports, the editing procedures used are the same. Editing a standard or Summary report includes changing the attributes of the Independent Variable, creating new point variables, editing tables, labels, and column totals.

Editing report objects

Note You cannot move a table to another page or outside the margins.

Note A label created in a table cannot be moved outside the table in a Summary report.

Note You cannot move a line past the positions of adjacent lines.

These procedures apply to both Summary and Dynamic reports. Follow the appropriate procedure.

- <Ctrl + S> or Select from the Edit menu option to be placed in edit mode.
- Click on the object to be edited, the border of the object becomes dashed to indicate it has been selected.

- <Ctrl +A> or Attribute from the Edit menu. A dialog specific to the selected object appears. This dialog is the same as the one used to create the object; refer to the previous sections that detail the creation process.
- To delete an object, select Delete from the Edit menu or <Ctrl + Del>.
- To move an object, click and hold the mouse button while dragging it to the new location.
- To resize a cell in a table, position the cursor over the line (horizontal or vertical). The cursor changes to a double-headed arrow. Click and drag the line to the new position.

Managing report files

Once you save a report, the next step is to generate the report so it can be available for printing and display in the Operate program. Generating a report converts it into a format that can be understood by ReportManager and Operate.

Saving reports

All report files are located in the Report subdirectory of your project directory. Generated report files contain the *.RRT file extension and saved report files contain the *.RPT file extension.

1. Select File and click Save As.
2. The Save Report window appears.
3. Type in the Filename plus the ".RPT" report extension.
4. Click OK.

Saving an existing report

- Select File and click Save.

Generating reports

1. Select File on the menu bar and click Generate Run Files. A message box appears briefly on the screen. If the report has not been generated, the Generate Report Run Files and the Search of Report Index windowes appear.
2. Click Yes.
3. The Edit Report Index appears.
4. Type in the description name. This name is used as the description when opened in the Operate program.
5. Click OK. The Select Report Index Entry window appears. Click OK.

Generating multiple files

Report provides an automated method for generating run files. One of three methods of batch generation is provided below.

1. Select Batch Run Files from the File menu item.
2. The Batch Compile window appears.
3. The Altered Files list box displays all files that have been modified since the last compilation.
4. Select the files for generation. To select all the files in the list box, click Select All. Clicking Unselect All deselects the files.
5. Follow one of the below procedures.

- "Do Selected" option to automate run file generation.

Step-by-Step

1. Click Do Selected. A window appears asking you to confirm your request to compile all selected files.
2. Click OK to proceed with the compilation of the files you have selected.

"Make" option to automate run file generation

1. Click Make. A window appears asking you to confirm your request to compile all altered files.
2. Click OK. This option generates all files that have changed since last generated. This option is useful if you are unsure of which files have been modified.

"Build All" option to automate run file generation

Note The "Build All" generation process does not prompt you if the report is not in the report Index. You must use the Master menu to add reports to the index.

The Build All option is useful for either initial project development or if the system database has been modified. System database modification often requires re-verification of database references.

1. Click Build All. A window appears asking you to confirm your request to compile all files.
2. Click OK. This option unconditionally compiles all files for a project, even if they have not changed since the last generation.

Deleting reports

Deleting generated reports

This action deletes the report from the Report Index. Once deleted, it cannot be viewed or printed in the Operate program.

1. Select File and click Report Index.
2. Select the desired report to be deleted.
3. Click Delete.

Deleting saved reports

This action totally deletes the report. This process cannot be reversed once the RPT file is deleted.

1. Open explorer in Windows.
2. Select the drive that contains the FuelsManager directory and then locate the Reports directory.
3. Delete the report with the .RPT and .RRT file extensions.

Note FuelsManager Historical Reports are created using Seagate's Crystal Reports software package, and access data from the FuelsManager Archive Database (See ArchiveManager). If order to modify the existing Standard Historical Reports or to create new reports, you must purchase and install Crystal Reports, version 7.0 or greater. Crystal Reports is not included in the FuelsManager product.

Historical reports

Historical reports are created using Seagate Crystal Reports. In order to modify or create new historical reports, it is necessary to purchase Seagate Crystal Reports. There are nine default report types that can be utilized for the Operate program.

- Current Tank Inventory Report
- Tank Inventory Repeat by Date
- Active Tank Report
- Inactive Tank Report
- Last Full Day Tank Change Report
- 7-Day Tank Change Report
- Last Full Week Tank Change Report
- Last Full Month Tank Change Report
- Month to Date Tank Change Report

By default, FuelsManager installs the Crystal Report Print Engine (the files necessary to preview and print Crystal Reports). This means it is not necessary to install Crystal Reports on your FuelsManager machine in order to view and print reports. It is only necessary to edit existing or create new reports.

In order for new reports to be available in the Operate program, they must be placed in the FMProject\Reports\Historical Folder.

Historical reports run against the FuelsManager Archive database (see Archiving Information section). If the necessary data has not been archived, the report will be incomplete. For example, running a last full month report before the archive database has accumulated a month (or more) of data will result in an incomplete report.

All the default FuelsManager historical reports access the archived information through an ODBC data source called “Historical Reports.” This data source must point to the FuelsManager archive database. This can be confirmed and, if necessary, edited with the Windows Administrative Tools, Data Sources (ODBC) applet.

16 Configuring the FuelsManager Web Server

This section describes how to set up the FuelsManager Web Server option for FuelsManager Oil & Gas Standard or Professional Editions.

Before You Begin

- Install FuelsManager Oil & Gas Standard or Professional Edition with the Web Server option.
- The FuelsManager Web Server is automatically configured with a site called 'Default'. The default administrator account is 'administrator', with password 'marietta'. The default administrator belongs to the default user group 'Administrators'.
- Ensure that your IT staff has networked your Web Server machine to all FuelsManager Standard and Professional systems at your site.
- You must have administrator access to all FuelsManager Oil & Gas systems that you will be monitoring through the Web Server.

Task Overview: Configuring the Web Server

The following table describes the recommended sequence of tasks for setting up the FuelsManager Web Server to manage multiple Sites.

Task	Reference
1. Log in to the Site.	"Logging In to the Web Server as an Administrator" on page 269
2. Set Site configuration settings	"Defining Site Properties" on page 270
3. Define User Groups and Users	"Defining Users and User Groups" on page 271
4. Define Products	"Defining Products" on page 276
5. Set Up the Data Dictionary	"Renaming Labels with the Data Dictionary" on page 276
6. Set Regional Settings	"Setting Regional Settings" on page 278
7. Set Up Fuel Tank Monitoring	"Setting Up Tank Farm Monitoring" on page 278
8. Configure Web Reporting	Chapter 17 on page 281

Logging In to the Web Server as an Administrator

To set up your FuelsManager Web Server, you will need to access the Web Server with an administrator account, as described in this procedure.

1. Open Internet Explorer.
2. Go to the FuelsManager Web Server address for your organization. This will be provided by your site administrators. The FuelsManager login screen opens.
3. Enter your administrative user name and password.
4. Click the Login Now button. The FuelsManager Web Server Interface opens in your browser.

Defining Site Properties

1. If you have not already done so, log in to the FuelsManager Web Server as described in "Logging In to the Web Server as an Administrator" on page 269. Log in as an administrator with full authority for the Site you will be editing, or log in as Administrator to SiteAdmin.
2. In the Sites list, select <All Sites> or an actual Site. This selection determines which Sites appear in the Sites Configuration list in the next step.
3. In the left treeview, select Configuration > Sites. The Configuration: Sites page opens showing the list of Sites and Site Groups available within the context of the login Site and the Site selection in the Site list.
4. Click the Edit icon for a Site or Site Group. The Site properties Configuration form appears.
5. On the General tab, enter or select the information described in the following table:

Field	Description
Name	Rename the site if appropriate
Number	Not used
SPLC Code	Not used
Address	Not used
City	Not used
State	Not used
Zip	Not used
Country	Not used
Phone	Not used
Fax	Not used
Emergency Contact	Not used
Emergency Phone	Not used
User	Not used
Password	Not used
Re-enter Password	Not used
Enabled	This setting enables the Physical Inventory feature for this Site. It is selected by default. If selected, (default), FuelsManager Web Server obtains current Physical Inventory data from FuelsManager Oil & Gas and FuelsManager Professional systems or other systems) that you have mapped as described in section , "Setting Up Tank Farm Monitoring" on page 278. If cleared, the Physical Inventory screens will show the last data that the FuelsManager Web Server obtains from the FuelsManager Oil & Gas and FuelsManager Professional system.
Group	Not used

6. On the System tab, enter or select the information described in the following table (mandatory entries are bolded):

Field	Description
Maximum Days to Retain Logs	If you select the 'Enable Audit Logging' checkbox, enter a number in this field to determine how many days each log entry will be retained.

Field	Description
Enable Audit Logging	Selecting this checkbox causes the FuelsManager Web Server to create a log of User actions, available on the left tree view under System Logs: Audit Log.
Mail Server	If you will be using Alarm & Event Mailing, enter the network address for the mail server used for Alarm & Event Mailing.
Mail User Name	If you will use Alarm & Event Mailing, enter the mail server User name. for the account that should receive Alarm & Event Mailing messages.
Mail Password	If you will use Alarm & Event Mailing, enter the mail server password for the account that should receive Alarm & Event Mailing messages.
Connection Mode	If you will use Alarm & Event Mailing, choose the connection method (LAN or DIALUP) necessary to connect to the mail server.
Dial-up Name	If you will use Alarm & Event Mailing, and you selected 'DIALUP' in the previous field, select the Dial-up system name.
SCADA System	Select the network address for the computer system upon which FuelsManager Oil & Gas graphics screens are stored.
Refresh Interval (seconds)	Enter a number to determine the frequency with which the FuelsManager Web Server refreshes FuelsManager Oil & Gas Edition graphics screens.
Report Directory	Set this field when you set up web reporting as described in Chapter 17.
Manage Reports	Set this field when you set up web reporting as described in Chapter 17.
Managed Report Directory	Set this field when you set up web reporting as described in Chapter 17.

7. On the Units tab, you can modify the way the Web Server shows measurement units. Change these settings if appropriate.
8. Click the OK button.

Defining Users and User Groups

As a FuelsManager administrator, you must ensure that only authorized individuals can access the system. Each person's access should be limited to the information that they need to know and the functions that they need to perform. You can accomplish this by setting up Users and User Groups as described in this section.

Introduction to Users, User Groups, and Security

In the FuelsManager Web Server, Users represent the individuals who will use the software through the web browser interface.

- User accounts include login names and passwords.
- To control each User's access to features and information, you associate them with one or more User Group.

User Groups are collections of Users that share the same role in your organization.

- By assigning the appropriate security rights to a User Group, you make these rights available to each User in the group.
- By default, your Site has four User Groups: Accountants, Administrators, Dispatchers, and Operators.

Understanding How Security is Implemented

Web Interface Security

When a User logs in to the Web Server Web Interface, the following occurs:

1. FuelsManager checks to ensure that the User name is valid for the login Site.
2. If the User is valid for the Site, FuelsManager verifies that the password entered matches the User.
3. If the User's password is correct, the Web Interface opens.
4. FuelsManager identifies the User Group(s) that the User belongs to, and identifies the security rights attached to the User Group(s).
5. FuelsManager enables or disables features according to the security rights assigned to User's User Group(s), within the context of the login Site.
6. When the User seeks to view or edit information in the web interface, the FuelsManager Web Server checks the User's User Group(s) to ensure that they have authorization to take that action.

Setting Up User Groups and Users – Overview

A. Define a User Group for each User role. Select the Security Rights and Companies appropriate for this group.
B. Add Users.
C. Identify which User Group(s) each User belongs to.

Note Refer to "Task Overview: Configuring the Web Server" on page 269.

Adding a User Group

User Groups are categories that contain individual Users. User Groups determine the security rights assigned to Users in the User Group.

Four User Groups are assigned to your Site by default: Accountants, Administrators, Dispatchers, and Operators. You can also add User Groups to meet your Site's unique needs.

1. If you have not already done so, log in to FuelsManager Oil & Gas Web Server as described in "Logging In to the Web Server as an Administrator" on page 269.
2. In the left treeview, select Configuration > System > User Groups. The Configuration page opens.
3. Click the Add button under the User Groups list.
4. At minimum, complete the User Group Name field. See the following table for a description of each field.

Field	Description
User Group Name	This name is used within FuelsManager Oil & Gas Web Server to identify this User Group.
Description	This description appears in the User Groups table.
Assigned Users	Users in this list have all of the Security Rights and Company associations identified for the User Group. To assign Users to the User Group, select the Users in the Unassigned Users list and then click the << button.

Field	Description
Unassigned Users	Users in this list are not associated with this User Group. To unassign Users, select them in the Assigned Users list and then click the >> button.

5. If User accounts exist, assign the appropriate Users to the group as follows:
   a. In the Unassigned Users list, select the User(s) that should be included in the User Group.
   b. Click the << button. The Users appear in the Assigned Users list.
6. Click the Security Rights button.
7. Assign security rights to the User Group as follows. Refer to the table below for information about each security right.
   a. In the Unassigned Rights list, select the security right(s) that Users in this group should have.
   b. Click the << button. The security right(s) appear in the Assigned Rights list.

Field	Description
Configure Accounting	This right is intended for future development and is not used in this version.
Configure Import Export	This right is intended for future development and is not used in this version.
Create Orders	This right is intended for future development and is not used in this version.
Execute Import Export	This right is intended for future development and is not used in this version.
Export Configuration Data	This right is intended for future development and is not used in this version.
Import Configuration Data	This right is intended for future development and is not used in this version.
Modify Allocation Data	This right is intended for future development and is not used in this version.
Modify Company Data	This right is intended for future development and is not used in this version.
Modify Equipment Data	This right is intended for future development and is not used in this version.
Modify Load Rack Data	This right is intended for future development and is not used in this version.
Modify Personnel Data	This right is intended for future development and is not used in this version.
Modify Product Data	When a User with this right logs in, the User can modify Products, Products: Additive Profiles, Products: DOT Hazardous Messages, Products: Product Groups, Products: Product Groups: Entry Messages, Products: Product Groups: Exit Messages, Product Messages. If you assign this right to a User Group, you should also assign the View Product Data right to the User Group.

Field	Description
Modify Reports	When a User with this right logs in, the User can add or modify a Report and add or modify a Report Group using the Configuration: Reports node on the left tree view. The following nodes are available on the left tree view: Configuration: Reports. If you assign this right to a User Group, you should also assign the View Reports right to the User Group.
Modify Sites and Site Groups	When a User with this right logs in, the User can modify Sites, Sites: Entity Ownership, Sites: Stations, and Sites: Tanks. If you assign this right to a User Group, you should also assign the View Sites and Site Groups right to the User Group.
Modify System Settings	When a User with this right logs in, the System node is available on the left tree view, and the User can make changes to System configuration settings, which includes Alarms & Events, Data Dictionary, User Groups, and Users.
Modify Ticketing Data	This right is intended for future development and is not used in this version.
Modify Transaction Aliases	This right is intended for future development and is not used in this version.
Modify Transaction Data	This right is intended for future development and is not used in this version.
Modify User Groups	When a User with this right logs in, the User can modify User Groups. If you assign this right to a User Group, you should also assign the View User Groups right to the User Group.
Modify Users	When a User with this right logs in, the User can modify Users. If you assign this right to a User Group, you should also assign the View Users right to the User Group.
Perform Closeout	When a User with this right logs in, the User can perform a Closeout.
Perform Product Update	This right is intended for future development and is not used in this version.
View Allocation Data	This right is intended for future development and is not used in this version.
View Company Data	This right is intended for future development and is not used in this version.
View Equipment Data	This right is intended for future development and is not used in this version.
View Installed Modules Status	This right is intended for future development and is not used in this version.
View Inventory Data	When a User with this right logs in, the User can view Physical Inventory data for the Site selected in the Site field. The following nodes are available on the left tree view: Inventory Management: Physical Inventory.
View Load Rack Data	This right is intended for future development and is not used in this version.
View Personnel Data	This right is intended for future development and is not used in this version.

Field	Description
View Product Data	When a User with this right logs in, the User can view Products and related data, including Product Messages. The following nodes are available on the left tree view: Products: Additive Profiles, Products: DOT Hazardous Messages, Products: Product Groups, Products: Product Groups: Entry Messages, and Products: Product Groups: Exit Messages.
View Reports	When a User with this right logs in, the User can view Reports using the Reports node on the left treeview. This right is not required to view reports using the View Printable button on the Transaction Detail.
View Sites and Site Groups	When a User with this right logs in, the User can view Sites and Site Groups and related data. The following nodes are available on the left tree view: Sites, Sites: Entity Ownership, Sites: Stations, Sites: Tanks.
View Ticketing Data	This right is intended for future development and is not used in this version.
View Transaction Aliases	This right is intended for future development and is not used in this version.
View Transaction Data	This right is intended for future development and is not used in this version.
View User Groups	When a User with this right logs in, the User can view User Groups.
View Users	When a User with this right logs in, the User can view Users.

8. Click the OK button to save your settings and return to the User Groups page.

Adding a User

1. If you have not already done so, log in to FuelsManager Oil & Gas Web Server as described in section on page 269.
2. In the left treeview, select Configuration > System > Users. The Configuration page opens.
3. Click the Add button under the Users list.
4. Fill out the form fields as appropriate. At minimum, complete the following fields: ID, Password, and Re-enter Password. See the following table for a description of each field.

Field	Description
ID	Enter a unique login User ID that the User must enter when logging in to the Site.
Password	Enter a password that the User will be required to enter when logging in to the Site.
Re-enter Password	Re-enter the password that the User will be required to enter when logging in to the Site. This must be identical to the password entered in the Password field.
Change Password at Login	If you select this checkbox, the system will prompt the User to change their password the first time that they log in.
Password must be periodically changed	If you select this checkbox, the system will periodically prompt the User to change their password at the number of days specified in the Password Aging (days) field.
Password Aging (days)	If you select the 'Password must be periodically changed' checkbox, enter a number in this field to determine the number of days that will pass before the system prompts the User to change their password.

Field	Description
Name	This name appears in the Users table on the Users Configuration page.
E-mail Address	The value that you enter in this field is only shown in this screen.
Assigned Groups	This field shows the User Groups that this User is assigned to.
Unassigned Groups	This field shows the User Groups that this User is not assigned to.

5. If User Groups exist, assign the User to the appropriate User Group(s) as follows:
   a. In the Unassigned Groups list, select any group(s) that this User should belong to.
   b. Click the << button. The group(s) appear in the Assigned Groups list.
6. Click the OK button.

Defining Products

Perform this procedure to define the types of fuel handled by the Site(s) in your organization.

Note Ensure that the Products you add to the Web Server match the Products defined in FuelsManager Oil & Gas Standard or Professional Edition systems for your Site.

1. If you have not already done so, log in to FuelsManager Oil & Gas Web Server as described in section on page 269.
2. In the Sites list, select the appropriate Site or Site Group.
3. In the left treeview, select Configuration > Products. The Configuration page opens.
4. Click the Add button. A form opens for defining the product.
5. Fill out the form fields as appropriate. At minimum, complete the following fields:
   - ID: enter a unique product ID. The ID can be alphanumeric.
   - Type: Select the product type - Additive, Blend, or Component.

   Note The Product ID should exactly match the identifier used in FuelsManager Professional; this will allow FuelsManager to automatically associate each tank with a Product.
6. Click the OK button.

Renaming Labels with the Data Dictionary

As an administrator, you can customize the FuelsManager Web Server screens for the Users at your Site, by providing alternate text for the labels on the screen. You can do this by setting up a Data Dictionary for your Site.

When the "Use Data Dictionary" checkbox is selected in the web User interface, the FuelsManager Web Server applies the Site's Data Dictionary to change the labels shown in the Web Interface screens.

You can define a Data Dictionary in two ways:

- Import a Data Dictionary file (see section)
- Manually enter the alternate values (see section

You can also export a Data Dictionary to an XML file to make it reusable.. See section on page 277 for more information.

Defining a Data Dictionary Automatically (Importing)

1. If you have not already done so, log in to the FuelsManager Web Server as described in section on page 269.
2. In the left treeview, click Configuration > Sites > Data Dictionary. The Data Dictionary Glossary page appears showing a list of keyvalue pairs.
3. Under the Glossary terms list, click the Import button.
4. Select a file. This is an XML file exported from FuelsManager Web Server Data Dictionary.
5. Click OK.

Defining a Data Dictionary Manually

1. If you have not already done so, log in to the FuelsManager Web Server as described in section on page 269.
2. In the left treeview, click Configuration > Sites > Data Dictionary. The Data Dictionary Glossary page appears showing a list of keyvalue pairs.
3. Find the interface element that you want to rename:
   - Click the appropriate letter button to show interface elements that begin with that letter.
   - If there are many entries for the letter you selected, the list for the selected letter is broken into multiple numbered sections. Use the number links under the list to find the entry that you are seeking.
4. Click the edit (pencil) icon for the term you want to change. A text box appears in the Value column for the selected term. If an alternate term was defined for this element, that text appears in the box; otherwise, the box is blank.
5. Edit the existing value if one exists, or enter a new value. This is the alternate text that will appear for the interface label when the "Use Data Dictionary" checkbox is selected.
6. Click the Update this Item icon (thumbs-up hand) to apply and save the change. If you make a mistake, click the Cancel Edit on this Item icon to cancel your changes for the current entry.
7. Repeat steps 3 through 6 to redefine all of the terms in the Data Dictionary, as appropriate for your Site.

Exporting a Site Data Dictionary to a File

You can save a Data Dictionary to an XML file, and import the data from the XML file to a FuelsManager Web Server Site Data Dictionary. You may want to do this for any of the following reasons:

- To back up the Data Dictionary
- To build or edit a Data Dictionary with an XML editor outside of the FuelsManager Web Server.

Importing is described in section on page 277.

1. If you have not already done so, log in to the FuelsManager Web Server as described in section on page 269.
2. In the left treeview, click Configuration > Sites > Data Dictionary. The Data Dictionary Glossary page appears showing a list of keyvalue pairs.

3. Click the Export button.
4. Select an XML file to export the Data Dictionary to.
5. Click OK.

Setting Regional Settings

Regional settings define the time formats and other characteristics of the Web Interface for your Site.

1. If you have not already done so, log in to the FuelsManager Web Server as described in section on page 269.
2. In the left treeview, click Configuration > Sites > Data Dictionary.
3. Click the Regional Settings tab. The Regional Settings page appears.
4. Enter or modify the settings as appropriate for the Site.

Setting Up Tank Farm Monitoring

You can configure the FuelsManager Web Server to monitor the status of fuel tanks for each FuelsManager Oil & Gas Standard and FuelsManager Professional system at your Site. FuelsManager Web Server Users can then view the status of the tanks for each system using their browser.

To execute this functionality, you set up a mapping in the FuelsManager Web Server to one or more FuelsManager Oil & Gas Standard or Professional Edition systems at your Site. The network address of the SCADA software (FuelsManager Oil & Gas or other systems), the unique ID for each tank, and other properties are stored in the FuelsManager Web Server database.

SCADA System	Mapping Method	Reference
FuelsManager Oil & Gas v7.0	Automatically Create	section
Other Systems	Manually Create	section on page 279

There are two mapping methods available; the method you use is determined by the type of SCADA system used at the FuelsManager Oil & Gas and FuelsManager Professional system.

This can be done manually by filling out a form for each tank, or automatically using the AutoCreate feature. Use FMDataManager to check the existing FuelsManager database.

> **Note** Adding tanks with AutoCreate saves time by automatically associating a product with each tank.

Adding Tanks with AutoCreate

This procedure automatically adds all tanks with all tank details to the FuelsManager Web Server database, by obtaining tank information from the selected Site's FuelsManager Oil & Gas system.

1. If you have not already done so, log in to the FuelsManager Web Server as described in section on page 269.
2. In the left treeview, click Configuration > Sites > Tanks. A Configuration page appears showing the Tanks list.

3. Under the Tanks list, in the Systems list, select the network computer on the which the FuelsManager Oil & Gas system for the desired Site is installed.
4. Click the AutoCreate button. FuelsManager Web Server sends a request to the FuelsManager Oil & Gas software on the system you specified. When FuelsManager Oil & Gas identifies each tank in its database; this information is then mirrored in the FuelsManager Web Server database.

   The FuelsManager Web Server can now monitor all of the tanks for the selected Site.

Adding Tanks Manually

Use this procedure to add one or more tanks to a FuelsManager Web Server Site. Consult the FuelsManager database for the Site to ensure that you exactly match each of the items in that database.

If you are establishing a new Site, you can save considerable time by using the Auto Create feature to add tanks automatically, as described in section .

1. If you have not already done so, log in to the FuelsManager Web Server as described in section on page 269.
2. In the left treeview, click Configuration > Sites > Tanks. A Configuration page appears showing the Tanks list.
3. Under the Tanks list, click the Add button. A form appears for defining the tank.

   Note The tank ID and all other tank information should be an exact duplicate of the tank detail information stored in the FuelsManager Professional database for the Site.
4. Enter or select the appropriate information for the tank.

   This is a multi-page form. Use the page number links at the bottom of the Variables table to access all of the tank detail fields.
5. Click the OK button.
6. Repeat the preceeding steps as needed to add all of the remaining tanks.

17 Configuring Web Server Reporting

This chapter describes how to set up the Web Server for FuelsManager Oil & Gas Standard or Professional Edition so users can access FuelsManager site reports using a web browser.

> Note This feature is only available with the Web Server option for FuelsManager Standard or Professional Edition.

Before You Begin

Prerequisites

The following prerequisites are required:

- FuelsManager Standard or Professional Edition must be installed with the Web Server option.
- The FuelsManager Web Server must be configured as described in Chapter 16

Key Information

> Note These URLs are the installation defaults; they can be changed during the installation process.

SQL Server 2005 Reporting Services

The FuelsManager Web Server uses Microsoft SQL Server 2005 Reporting Services to manage and generate reports. There are two web utilities that are used to manage and access Reporting Services:

- Report Manager (http://localhost/Reports): a utility for managing and configuring reports
- Report Server (http://localhost/ReportServer): a utility for running reports

About Report Layout and Data Source Files

The FuelsManager Web Server uses two types of files to generate a report: 1) an report layout file (.rdl), which contains the report layout, and 2) a data source file (.rds), which describes how to obtain the appropriate data from the database.

Each report can use more than one data source. The report setup procedures in this chapter describe how to configure each of the standard reports to use the appropriate layout and data source(s).

Task Overview: Configuring Web Reporting

This section describes how to set up access to the standard FuelsManager Oil & Gas reports through the FuelsManager Oil & Gas Web Server Interface. The procedure to set up other reports will be similar, but some details may vary.

The reports discussed in this chapter are On-Demand Reports; they are generated when they are requested through the browser interface.

Task Overview: Configuring Reports

This section describes the tasks involved in providing access to the standard reports included with your Web Server installation.

Task	Application Used	Refer to
1. Create a user in Windows for access to the Report Server.	Operating System	page 282
2. Create a user in SQL Server with access to the reporting databases.	SQL Server Enterprise Manager	page 282
3. Create a user in Report Manager with the role (permissions) required to obtain reports from the Report Server.	SQL Server Reporting Services Report Manager	page 283 and page 283
4. Create a directory in Report Manager for reports.	SQL Server Reporting Services Report Manager	page 284
5. Create data sources and deploy them to the Report Server.	SQL Server Reporting Services Report Manager	page 284
6. Deploy predefined reports to the Report Server.	SQL Server Reporting Services Report Manager	page 286
7. Set the report properties (parameters and data source(s)*) for each report.	SQL Server Reporting Services Report Manager	page 286
8. Set the Report Server address.	FuelsManager Oil & Gas Web Server	page 289
9. Determine how the report list is displayed to users.	FuelsManager Oil & Gas Web Server	page 289
*This task may have been performed previously. If so, skip the task		

Creating a User in Windows for Reports

When the FuelsManager Web Server receives a request for a report, SQL Server Reporting Services uses the Windows system user account on the Web Server machine to request the report from the Web Server. The Report can then be sent to the browser on the client system.

1. Create a new Windows user on the Web Server system with the following properties:
   - user name: RPTUSER
   - domain: local domain
2. Assign the new RPTUSER user to the following user groups:

   Users
   and SQLServer2005ReportingServicesWebServiceUser$*domain*$MSSQLSERVER.

   Where *domain* = the local domain for the Web Server machine. MSSQLSERVER is the database instance name.
3. Select the "User Cannot Change Password" and the "Password Never Expires" checkboxes.

Create a User in SQL Server for Databases

Under the main security node in SQL Server 2005, do the following:

1. Under the main security node in SQL Server 2005, create the user 'RPTUSER' under "Logins". Be sure to use the domain name (i.e. *domain*\RPTUSER).
   This allows the ReportViewer to log in to SQL Server 2005.

2. Under the ReportServer database security node, add the RPTUSER user with the following database role membership: db_datareader, db_datawriter, db_owner, and RSExecRole.
3. Under the ConsolidatedDB database security node, add the RPTUSER user with the following database role membership: db_datareader, db_datawriter, and db_owner.
4. Add the RPTUSER user to each stored procedure that is used by the reports, and grant RPTUSER Execute permission for each stored procedure.

Creating a User in Report Manager for Reports

The Reporting Services Report Server uses two SQL Server databases, ReportServer and ReportServerTempDB, to store data it uses to manage reports. Other databases may also be used to obtain data for reports.

This section describe how to set up a database user that Reporting Services will use to access these databases.

1. Connect to the Reporting Services Report Manager on the server hosting the Report Server (ReportServer) database as described below.
2. Select the Properties tab. A list of Groups and Users is be displayed with their roles.
3. Select the New Role Assignment link. A page is displayed for adding a new user and assigning a role or roles to the user.
4. In the 'Group or user name' field, add the RPTUSER user along with the domain name (*DOMAIN*\RPTUSER)
5. In the Roles list, select the checkbox for the Browser role only.
6. Click the OK button to add the user. The new user appears on the Security page with the Browser role assigned.

Opening Report Manager

Report Manager is the administrative utility provided with SQL Server 2005 Reporting Services. You will use Report Manager to perform most of the configuration of reports for the Web Server. You can open Report Manager when you are logged on to the Report Manager server, or remotely by using the server URL.

1. Open Microsoft Internet Explorer.
2. In the Address box, do one of the following:
   - If you are logged on to the server, enter: localhost/reports. The Report Manager opens, showing the SQL Server Reporting Services home page.
   - If you are not logged on to the server, you can administer the Report Server remotely by entering
     http://*servername*/reports.

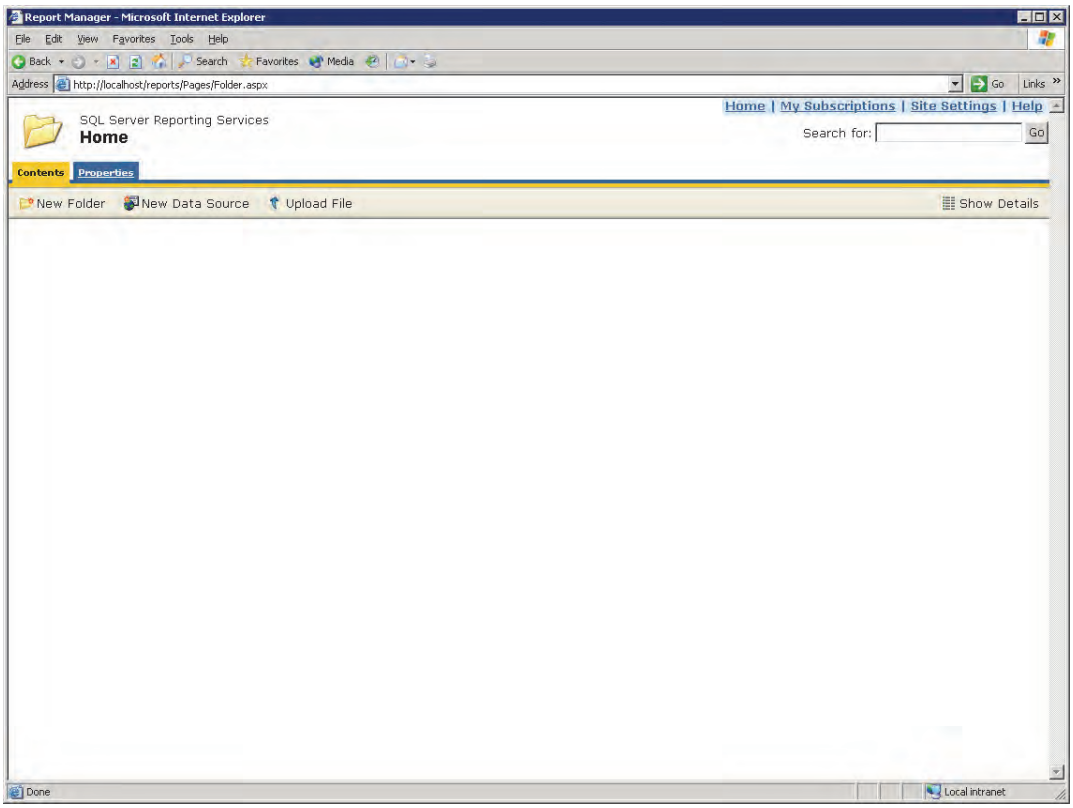


Figure 17–1: Report Manager Home page

Create a Reports Directory in Reporting Services

Reporting Services "stores" each report definition and data source in a a virtual directory that you define in Report Manager. The FuelsManager Web Server refers to this directory to retrieve reports when they are requested.

1. Connect to the Reporting Services Report Manager on the server hosting the Report Server (ReportServer) database as described in “Opening Report Manager” on page 283.
2. Create the report directory(s).
3. Click the New Folder button.
4. Enter a directory name. You can use any name, but FuelsManager by default refers to a directory called Standard Reports.
5. Click OK.

Creating a Data Source in Report Manager

Each report that users obtain through the FuelsManager Oil & Gas Web Server uses one or more data source (.rds) files to obtain information from the database. A data source contains a connection definition (type or string), and user credentials to limit access to the data.

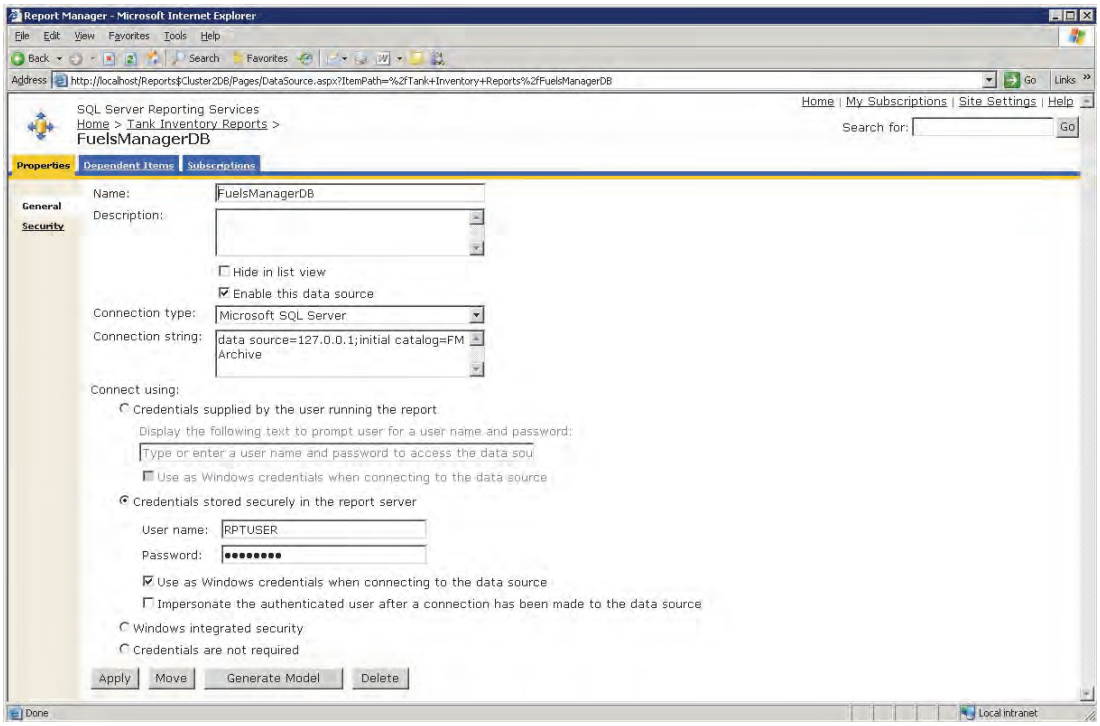
To define a data source, you must provide a name, choose a security method, and provide instructions for retrieving the data from the database. These instructions can be predefined, for example, in a data extension, or you can enter the instructions as text (a Connection String).

The standard reports supplied with your FuelsManager Web Server installation use the FuelsManagerDB data source, which will have the file name FuelsManagerDB.rdl.

1. Connect to the Reporting Services Report Manager on the server hosting the Report Server (ReportServer) database as described in “Opening Report Manager” on page 283.
2. Open the report directory that you created in “Create a Reports Directory in Reporting Services” on page 284.
3. Click the New Data Source button. The New Data Source page opens.
4. In the Name box, enter the data source name. For standard reports, the data source name is FuelsManagerDB.
5. Ensure that the Enable this data source checkbox is selected.
6. In the Connection Type list, select the appropriate type. If you are adding the FuelsManagerDB data source, select Microsoft SQL Server.
7. In the Connection String box, enter a connection string if appropriate. If you are adding the FuelsManagerDB data source, use the following.

   data source=*servername*;initial catalog=FM Archive

   Note: Replace ’servername’ with the computer name or IP address of the Reporting Services server.
8. Under Connect Using, select "Credentials stored securely in the report server".
9. In the User Name field, enter the user name for the user that your created in “Creating a User in Windows for Reports” on page 282. The name used in this chapter is RPTUSER.
10. In the Password field, enter the password that you assigned to RPTUSER in “Creating a User in Windows for Reports” on page 282.



11. Click the OK button to save the data source.
12. Proceed to the next section.

Deploying Reports to the Report Server

Before a report can be used in FuelsManager Oil & Gas Web Server, you must make it available to the Reporting Services Report Server using the following procedure.

1. Connect to the Reporting Services Report Manager on the server hosting the Report Server (ReportServer) database as described in “Opening Report Manager” on page 283.
2. Open the appropriate report folder. You should have at least two report folders, as described in “Creating a Data Source in Report Manager” on page 284.
3. Click the Upload File button. The upload file page opens.
4. Click the Browse button next to File to Upload.
5. For standard reports, navigate to:
   Program Files\FuelsManager\FMProject\WebReports.
6. Select the report layout file (.rdl) for the report you are registering, and then click Open. If you are configuring the standard reports, select one of the standard reports listed below.

Standard Reports
ActiveTank.rdl
CurrentTankInventory.rdl
InactiveTank.rdl
LastFullDayTankChange.rdl
LastFullMonthTankChange.rdl
LastFullWeekTankChange.rdl
MonthToDateTankChange.rdl
SeventhDayTankChange.rdl
TankInventoryByDate.rdl

7. In the Upload File page, click the OK button.
8. Repeat the process above until you are finished registering reports. If you are registering standard reports, register all of the reports listed above.
9. Proceed to the next section.

Setting Report Properties

Use this procedure to define the settings for each report that you have registered with Microsoft Reporting Services. This includes providing the report name that end users will see in their browser, and associating the report with data source(s).

Reports must be registered as described above before you can set report properties.

If you are configuring standard reports, set report properties for each of the reports.

Opening the Report Properties Page

1. Connect to the Reporting Services Report Manager on the server hosting the Report Server (ReportServer) database as described in “Opening Report Manager” on page 283.
2. Open the reports folder that you created when you registered the reports in “Deploying Reports to the Report Server” on page 286. If you are configuring the standard FuelsManager Oil & Gas Web Server reports, select the folder containing the standard reports.

Note An error message appears because you are opening the report before you set the report properties. Close the message.

3. Click on a report. If you are configuring the standard reports, select one of the standard reports listed in the table on page 286. The Connect To window appears.
4. Log in using your Windows user name and password.
5. If prompted, click on the Properties tab. The General report properties page appears.

Renaming, Hiding, or Showing a Report

You can determine the name by which the report is known in Reporting Services. When you configure the reports in FuelsManager Oil & Gas Web Server, you can give them different names and descriptions. In general, there is no need to change a report name in Reporting Services.

1. Connect to the Reporting Services Report Manager on the server hosting the Report Server (ReportServer) database as described in "Opening Report Manager" on page 283.
2. Open the General report properties page for the report as described in "Opening the Report Properties Page" on page 286.
3. To rename the report, type a new name in the Name field. If you are configuring the standard reports, you do not need to rename the report.

   Note When you register a report, FuelsManager automatically assigns the report layout file name (without the extension) as the report name.
4. To hide the report, select the Hide in List View checkbox.
5. Click the Apply button.

Setting Report Parameters

Parameters are variable data values that define each report when it is generated. This section describes the general steps for configuring parameters.

Only one of the standard reports, TankInventoryByDate, has parameters that you need to set. Refer to the table on section on page 288 for parameter settings for this report.

1. Connect to the Reporting Services Report Manager on the server hosting the Report Server (ReportServer) database as described in "Opening Report Manager" on page 283.
2. Open the General report properties page for the report as described in "Opening the Report Properties Page" on page 286.
3. In the command list on the left side of the page, click Parameters.
4. Set the parameters as appropriate. The table below describes each parameter setting field in general. If you are setting up standard reports, See the table on page 288 to set the parameter values for the standard report TankInventoryByDate.

Parameter Field	Description
Parameter Name	The actual report parameter used by the application. This does not appear on user screens. Not editable.
Data Type	The data type of the parameter. Not editable.
Has Default	Select this checkbox to use the value entered in the Default Value field. Do not select this checkbox for the following parameters: Site, SiteIndex, LoginSiteIndex, and UserIndex.

Parameter Field	Description
Default Value	If the Has Default checkbox is selected, this value is entered automatically when the report is generated. Clear this field for the following parameters: Site, SiteIndex, LoginSiteIndex, and UserIndex.
Null	Not used.
Hide	If the parameter should not be displayed to users, clear this checkbox. This will disable the Prompt User and Display Text fields.
Prompt User	Select this checkbox for any parameters that are not hidden (see the Hide option description). If you clear this checkbox, you must select the Hide checkbox or an error will occur when users attempt to view the report.
Display Text	If blank, the parameter will not appear on the report screen. If text is entered here, the text appears on the report screen to prompt the user.

Parameter Field	Description
Parameter Name	ReportDate. This field is not editable.
Data Type	Not editable.
Has Default	Do not select.
Default Value	Leave blank.
Null	Not used.
Hide	Leave blank.
Prompt User	This checkbox must be checked.
Prompt String	Enter 'Report Date'. This text appears on the report screen to prompt the user.

5. Click the Apply button to save the changes.
6. Proceed to the next section.

Setting Data Source(s) Manually for Each Report

Each report in SQL Server Reporting Services must be associated with at least one data source. Each standard report must be associated with the FuelsManagerDB data source.

If you created data sources before you deployed reports, as described in section on page 284, the data sources are automatically configured for each report. If not, associate the data source(s) manually using the following procedure.

Note Before you begin, you must have deployed the reports as described in section on page 286.

1. Connect to the Reporting Services Report Manager on the server hosting the Report Server (ReportServer) database as described in section on page 283.
2. Open the General report properties page for the report as described in section .
3. In the command list on the left side of the page, click Data Sources.
4. Under A Shared Data Source, click the Browse button and locate the first data source associated with this report. For standard reports, locate FuelsManagerDB.
5. Select the data source file. For standard reports, select FuelsManagerDB.

6. Click the OK button to save the Data Source selection. The data source appears on the report Data Sources screen.
7. Repeat steps 4 through 6 as needed to identify the remaining Data Sources for this report.

   This step does not apply to standard reports.
8. Click the Apply button on the Data Sources page.

   Caution If you do not click the Apply button, your Data Source settings will not be saved for this report.

Setting Report Server & Standard Report Addresses

The Report Server is the Reporting Services application that processes requests for reports. Before FuelsManager Web Server users can access reports, you must supply the FuelsManager Web Server with the URL for the Report Server, as described in section .

You must also identify the virtual directory that contains the deployed web reports, as described in section on page 284. The Report Server uses this directory to locate reports when they are requested.

Setting the Report Server Address

1. Log in to the Web Server as an administrator.
2. In the left treeview, select Configuration > System Settings.
3. In the Report Server URL field, enter the network or local address (URL) for the Report Server in the Report Server URL field.

   By default, this is: http://localhost/ReportServer. However, if the Report Server is not hosted on the same machine as FuelsManager, you will need to provide the complete URL, i.e. http://myserver/ReportServer.

   Also, if, when you installed Reporting Services you selected an alternate name for the Report Server application, you will need to enter this alternate here (i.e. /FuelsManagerReportServer).
4. Click the OK button.

Setting the Reports Directory

1. Log in to the Web Server as an administrator.
2. In the left treeview, select Configuration > Sites.
3. In the Sites table, click the Edit field for your site. The Configuration page opens.
4. Click the System tab.
5. In the Report Directory field, enter the path to the directory that contains the deployed reports. See section on page 284 for more information about this directory. For example, if the report directory is 'Standard Reports', enter '\Standard Reports'.
6. Click the OK button. The Sites table appears.

Choosing How the Report List is Displayed to Users

When a user opens the FuelsManager Oil & Gas Web Server Interface, the available reports are displayed in groups. You must define these report groups and set which reports will appear

under each group name. This section describes how to create a report group and how to assign reports to the group.

Note This procedure does not apply to Managed Reports.

Creating a Report Group

1. Log in to the Web Server as an administrator.
2. In the left treeview, select Configuration > Reporting.
3. Click the Add/Modify Groups option.
4. Click the Add button to add a group.
5. Type a group name in the Name box, and then click the Update icon for the new group. The icon is located in the Edit column.
6. Click Close.

Assigning Reports to a Report Group

1. Log in to the Web Server as an administrator.
2. In the left treeview, select Configuration > Reporting.
3. Click the Report Assignment tab. The Report Assignment page opens.
4. On the Report Assignment Configuration page, click Add a Report. The Report Detail Configuration screen opens.
5. Fill out the Report Name, Report Path, Report Description, and Assigned Group fields as follows:
   - Report Name – enter a name; for standard reports, use the name provided, such as Journal Gross. This name will appear in the report list as the link to open the report.
   - Report Path – Select the appropriate report from the available list. Note that the list only shows reports that you have deployed to the Report Server.
   - Report Description – enter a short description of the report. This text will appear under the report name in the report list.
   - Assigned Group – In the Group List list, select the group that you added earlier in this procedure. Click the << button to place the group in the Assigned Group box.
6. Click Save. The Report Assignment page appears.
7. Repeat steps 3 through 6 for each of the remaining reports in the report directory.

18 Configuring Multiple Monitors

FuelsManager supports using multiple monitors for multiple views of the FuelsManager software. The multiple monitor function allows you to configure up to 4 monitors that act as one continuous monitor or designate a specific function in each monitor. The individual Operate displays you can place in a monitor are:

- Graphics
- Tank Detail
- Alarm Summary
- Real-Time Trends—defaults to the Primary monitor
- Historical Trends—defaults to the Primary monitor
- Tank Groups
- Movement Summary
- Movement History

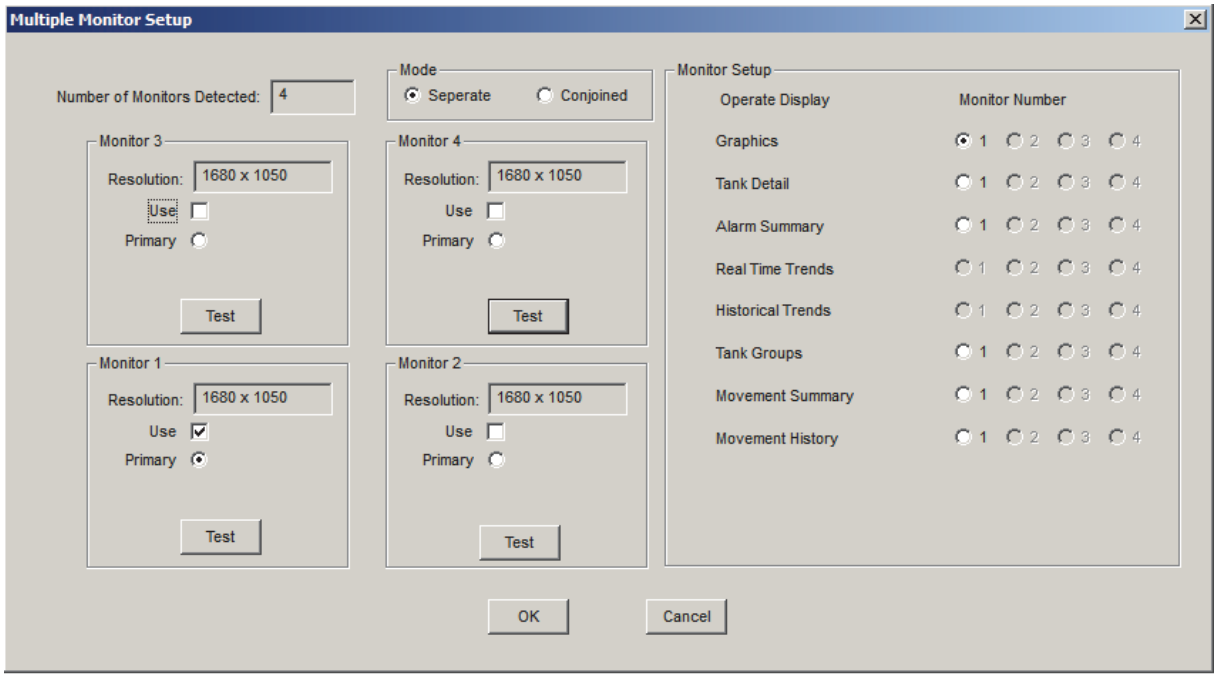
Multi-Monitor Prerequisites

To use this feature, you need to install a graphics card that supports the number of monitors you want to configure. You also need to install the required drivers and perform the configuration required by the graphics card. Instructions can be found in the documentation supplied by the graphics card manufacturer.

Configuring Multiple Monitors

To configure multiple monitors

1. Open Configuration.
2. Click User Interface > Multiple Monitor Setup. The Multiple Monitor Setup window opens and is shown below.



3. The Number of Monitors Detected is automatically populated from the graphics card. Also, the Resolution of each of the detected monitors is populated.
4. The Monitor 1 through Monitor 4 is a representation of each of the individual monitors and the order of precedence for each monitor.
5. You can designate one and only one monitor to be Primary.

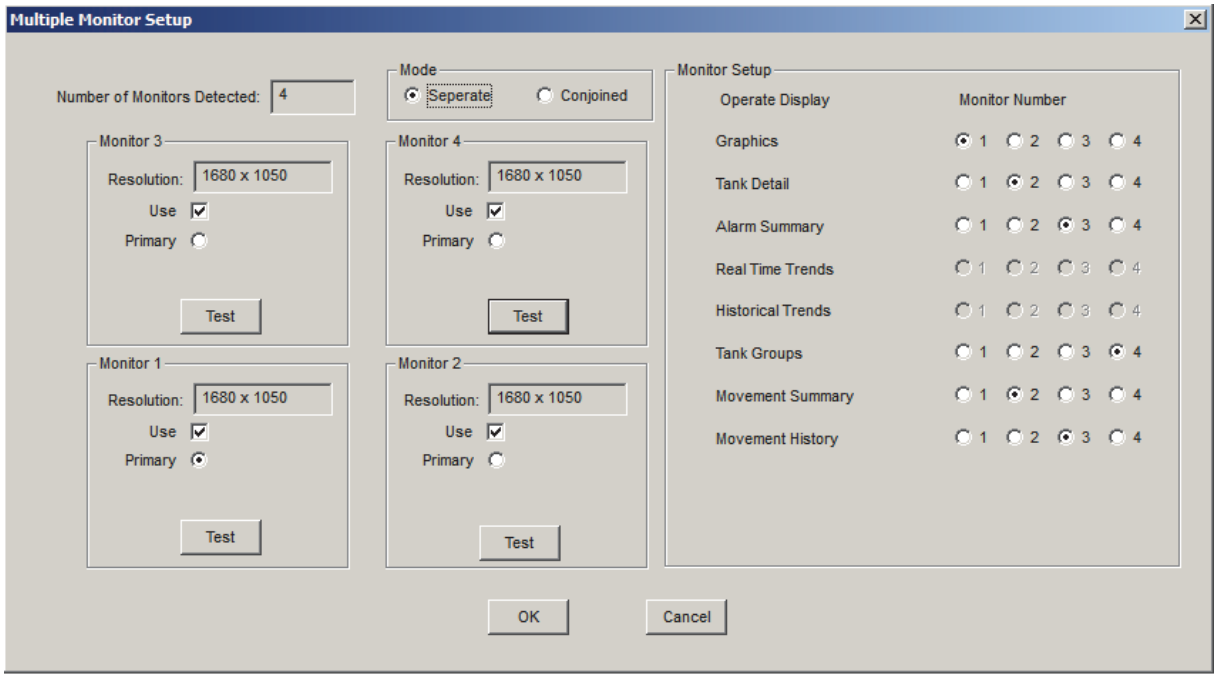
   Note The Primary monitor contains the alarm line and the navigation window panes.

6. Select the Use check box for each monitor that you want to enable.
7. The Test button allows you to check which monitor in your setup is Monitor 1, 2 3, or 4.
8. The Mode area allows you to select if the monitors display Separate screens or Conjoined screens which means all monitors act as one large monitor.

   Note In Separate mode, the Alarm Summary must be designated to a monitor that is in use.

   Note If you select Conjoined, the Monitor Setup area is unavailable.

9. In the Monitor Setup, you can select a monitor number for each of the Operate displays.
10. Click OK when you have the multiple monitors configured. Below is an example of a separate multiple monitor setup.



Multiple Monitor Examples

A Point Parameters

This appendix describes each of the available FuelsManager tank point, input point, and output point parameters and their function. Tank point, input point, and output point parameters are displayed in FuelsManager as an abbreviated parameter name, up to twenty characters long, and a more complete descriptive name, up to forty characters long. The two names for each parameter are listed below, followed by a more detailed description.

Tank Points - Process Data

Tank Points - Process Data	
DESCRIPION – POINT DESCRIPTION	This process variable is the name by which the tank is known to the user. This variable is entered when configuring the tank point, but cannot be modified via Operate
PRODUCT – PRODUCT	This process variable is the type of product contained in the tank. This variable is entered when configuring the tank point, but can be viewed or modified from Operate by a user with sufficient privileges. The product variable contains a string that is the combination of the 20 character Product Code and the 30 character Product Description
PRODUCT CODE – PRODUCT CODE	This variable is the product code part of the Product process variable
PRODUCT DESCRIPTION – PRODUCT DESCRIPTION	This variable is the product description part of the Product process variable
LEVEL – TANK LEVEL	This process variable is the current level of the tank; this variable is usually measured by automatic tank gauging but can be manually entered by the operator
LEVEL TIME – TIME OF LAST LEVEL UPDATE	This process variable is the last time that the tank level was updated. This variable can be viewed from the Operate interface but cannot be modified.
TEMPERATURE – TANK TEMPERATURE	This process variable is the current temperature of the tank; this variable is usually measured by automatic tank gauging but can be manually entered by the operator
TEMPERATURE TIME – TIME OF LAST TEMP. UPDATE	This process variable is the last time that the tank temperature was updated. This variable can be viewed from the Operate interface but cannot be modified
DENSITY – PRODUCT DENSITY	This process variable is the current observed density of the product at the current temperature, this variable can be measured by automatic tank gauging, manually entered by the operator or calculated by FuelsManager from the Std., Density and current temperature
DENSITY TIME – TIME OF LAST DENSITY UPDATE	This process variable is the last time that the Density value was updated. This variable can be viewed from the Operate interface but cannot be modified
WATER LEVEL – WATER BOTTOM LEVEL	This process variable is the level of water in the tank, this variable can be measured by automatic tank gauging or manually entered by the operator
WATER LEVEL TIME – TIME OF LAST WATER LEVEL	This process variable is the last time that the Water Level value was updated. This variable can be viewed from the Operate interface but cannot be modified

Tank Points - Process Data	
%BSW – BOTTOM SEDIMENT AND WATER	This process variable is the percentage of impurities (bottoms, sediment and water) in the product, if required, the operator usually manually enters this variable, however, the variable can be linked to automatic gauging systems if required
%BSW TIME – TIME OF LAST BS&W UPDATE	This process variable is the last time that the tank %BSW was updated
VOLUME GROSS – GROSS TANK VOLUME	This process variable is the total measured volume of the product in the tank corrected for Water Level, % BSW, and Roof Volume. FuelsManager normally calculates this from the tank gauge reading and the tank–strapping table, however, the value can also be measured by automatic tank gauging systems or manually entered by the operator
VOLUME TIME GROSS – TIME OF LAST GROSS VOL. UPDATE	This process variable is the last time that the tank gross volume was updated. This variable can be viewed from the Operate interface but cannot be modified
VOLUME NET – CORRECTED TANK VOLUME	This process variable is the corrected volume of the product in the tank. FuelsManager normally calculates this by multiplying the Gross Volume by the Volume Correction Factor, however, the value can also be measured by automatic tank gauging systems or manually entered by the operator
VOLUME TIME NET – TIME OF LAST NET VOLUME UPDATE	This process variable is the last time that the tank net volume was updated. This variable can be viewed from the Operate interface but cannot be modified
VOLUME REMAINING NET – NET REMAINING STORAGE	This process variable is the Net Volume of product that can be added to the tank. FuelsManager normally calculates this by subtracting the current Net Std. Volume from the Net Std. Volume at the maximum working level, however the value can also be measured by automatic tank gauging systems or manually entered by the operator
VOLUME AVAILABLE NET – NET AVAILABLE PRODUCT	This process variable is the Net Volume of product that can safely be issued from the tank. FuelsManager normally calculates this by subtracting the Net Std. Volume at the minimum working level from the current Net Std. Volume. However this value can be measured by automatic tank gauging systems or manually entered by the operator
STANDARD DENSITY – STANDARD DENSITY	This process variable is the current corrected density of the product at the standard temperature as defined by the selected correction method. This variable can be measured by automatic tank gauging, manually entered by the operator or calculated by FuelsManager from the observed density, current temperature and correction method
MASS – PRODUCT MASS	This process variable is the mass of product. FuelsManager normally calculates this by multiplying the Net Std. Volume by the Std. Density. However this value can be measured by automatic tank gauging systems or manually entered by the operator
MASS TIME – TIME OF LAST MASS UPDATE	This process variable is the last time that the tank mass was updated. This variable can be viewed from the Operate interface but cannot be modified
SOLIDS LEVEL – BOTTOM SOLIDS LEVEL	This process variable is the level of solids in the tank, the operator usually manually enters this variable, however, the variable can be linked to automatic gauging systems if required
SOLIDS LEVEL TIME – SOLIDS LEVEL TIME	This process variable is the last time that the tank solids level was updated. This variable can be viewed from the Operate interface but cannot be modified.

Tank Points - Process Data	
FLOW – TANK INPUT / OUPUT FLOW	This process variable is the flow of product into or out of the tank. FuelsManager normally calculates this sampling the gross volume at user-defined intervals and averaging the change in volume over a user-defined number of samples. However, this value can also be measured by automatic tank gauging systems or manually entered by the operator
FLOW TIME – TIME OF LAST FLOW UPDATE	This process variable is the last time that the tank flow was updated. This variable can be viewed from the Operate interface but cannot be modified.
WATER VOLUME – WATER BOTTOM VOLUME	This process variable is the volume of water in the tank. FuelsManager normally calculates this from the water level value and the tank strapping table, however, the value can also be measured by automatic tank gauging systems or manually entered by the operator
GAUGE POSITION – LEVEL GAUGE POSITION	This process variable is the current position of the tank level gauge measuring head. This variable is only applicable to servo type tank gauges, where the measuring device can be positioned at points in the tank other than the product level. This variable is usually measured by automatic tank gauging but can be manually entered by the operator
GAUGE POSITION TIME – GAUGE POSITION TIME	This process variable is the last time that the tank gauge position was updated. This variable can be viewed from the Operate interface but cannot be modified.
DENSITY TEMPERATURE– TEMPERATURE FOR MEASURED DENSITY	This process variable is the measured temperature at the time the density data was last updated. If entered FuelsManager uses this data to convert the density data to corrected density. This variable is normally measured by automatic tank gauging, but can be manually entered by the operator. Typically, tank gauges that support density measurements provide this data. Otherwise, the laboratory may provide this data for manual entry
DENSITY TEMP. TIME – DENSITY TEMP. TIME	This process variable is the last time that the tank density temperature was updated. This variable can be viewed from the Operate interface but cannot be modified
SOLIDS VOLUME – BOTTOM SOLIDS VOLUME	This process variable is the volume of solids in the tank. FuelsManager normally calculates this from the solids level value and the tank strapping table, however, the value can also be measured by automatic tank gauging systems or manually entered by the operator
VCF – VOLUME CORRECTION FACTOR	This process variable is the volume correction factor, used to correct gross volume for the effects of product thermal expansion. FuelsManager normally calculates this from temperature, density, and selected correction method, the variable can also be linked to automatic gauging systems or manually entered if required
VOLUME STRAP VOLUME	This process variable is the observed volume of the product in the tank as read from the tank strapping table. FuelsManager normally calculates this from the tank gauge reading and the tank strapping table, however, the value can also be measured by automatic tank gauging systems or manually entered
ROOF CORRECTION – ROOF VOLUME	This process variable is the volumetric effect of the tanks floating roof. If a floating roof type tank is defined, FuelsManager normally calculates this from the roof weight and roof position. However, the value can also be measured by automatic tank gauging systems or manually entered

Tank Points - Process Data	
VOLUME REMAINING GROSS – GROSS REMAINNG VOLUME	This process variable is the Gross Volume of product that can be added to the tank. FuelsManager normally calculates this by subtracting the current Gross Volume from the Gross Volume at the maximum working level. However, the value can also be measured by automatic tank gauging systems or manually entered by the operator
VOLUME AVAILABLE GROSS – GROSS AVAILABLE VOLUME	This process variable is the Gross Volume of product that can safely be issued from the tank. FuelsManager normally calculates this by subtracting the Gross Volume at the minimum working level from the current Gross Volume. However, this value can be measured by automatic tank gauging systems or manually entered by the operator
MASS REMAINING – REMAINING MASS	This process variable is the Mass of product that can be added to the tank. FuelsManager normally calculates this by subtracting the current Mass from the Mass at the maximum working level. However, the value can also be measured by automatic tank gauging systems or manually entered by the operator
MASS AVAILABLE – AVAILABLE MASS	This process variable is the Mass of product that can safely be issued from the tank. FuelsManager normally calculates this by subtracting the Mass at the minimum working level from the current Mass. However, this value can be measured by automatic tank gauging systems or manually entered by the operator
VOL STRAP – H20 – STRAP VOLUME MINUS WATER VOLUME	This process variable is the tank strapping volume minus the water volume. FuelsManager normally calculates this by subtracting the current water volume from the current strapping volume. However, this value can be measured by automatic tank gauging systems or manually entered by the operator
VOL STRAP – COR EXP – STRAP VOLUME MINUS CTSH	This process variable is the tank strapping volume minus the thermal expansion effect of the tank shell. FuelsManager normally calculates this by subtracting the volumetric effect of the tank shell correction factor from the current strapping volume. However, this value can be measured by automatic tank gauging systems or manually entered by the operator
VOL NET – C&W – NET VOLUME MINIUS C&W CORRECTION	This process variable is the Net Std. volume minus the correction for sediment and water. FuelsManager normally calculates this by subtracting the correction for sediment and water from the current Net Std. volume. However, this value can be measured by automatic tank gauging systems or manually entered by the operator
TANK SHELL COR. FAC – TANK SHELL CORRECTION FACTOR	This process variable is the tank shell correction factor, used to correct gross volume for the effects of tank shell thermal expansion. FuelsManager normally calculates this from product temperature, ambient temperature, shell material, and type of tank shell, the variable can also be linked to automatic gauging systems or manually entered if required
C&W COR. FAC – C&W CORRECTION FACTOR	This process variable is the correction for sediment and water, used to correct gross volume for the effects of water and sediment in the bottom of the tank. FuelsManager normally calculates this from water level and solids level variables, the variable can also be linked to automatic gauging systems or manually entered if required
BSW VOLUME – VOLUME FOR %BSW	This process variable is the volume base, sediment and water impurities in the tank. FuelsManager normally calculates this from the %BSW value and the current gross volume. However, the value can also be measured by automatic tank gauging systems or manually entered by the operator

Tank Points - Process Data	
TANK BOTTOM VOLUME - TOTAL BOTTOM VOLUME	This process variable is the combined water and solids volumes in the tank. FuelsManager normally calculates this by adding the water volume to the solids volume values. However, the value can also be measured by automatic tank gauging systems or manually entered by the operator
VAPOR TEMP. - VAPOR TEMPERATURE	This process variable is the temperature of the vapor space above the product in the tank. This variable is usually measured by automatic tank gauging but can be manually entered by the operator. This data is normally only applicable to tanks containing liquified hydrocarbons.
TEMP VAPOR TIME - VAPOR TEMPERATURE TIME	This process variable is the last time that the tank level was updated. This variable can be viewed from the Operate interface but cannot be modified.
LEVEL CHANGE RATE - RATE OF LEVEL CHANGE	This process variable is the rate of change of the level value due to movement of product into or out of the tank. FuelsManager normally calculates this sampling the level at user-defined intervals and averaging the change in level over a user-defined number of samples. However, this value can also be measured by automatic tank gauging systems or manually entered by the operator
LEVEL RATE TIME - LEVEL RATE TIME	This process variable is the last time that the tank level change rate was updated. This variable can be viewed from the Operate interface but cannot be modified.
GAUGE COMMAND - LEVEL GAUGE COMMAND	This process variable is used to issue commands to automatic tank gauges, the possible values depend in the tank gauge modifier configured for the tank. This variable is normally entered by the operator, but can be linked to automatic tank gauging systems to allow remote commands to the tank gauges
GAUGE STATUS - LEVEL GAUGE STATUS	This process variable represents the status of the automatic tank gauge. In order to use this variable the gauge status variable must be linked to the status information data in the tank gauge. Possible statuses depend on the tank gauge in use. This variable is normally linked to automatic tank gauging systems but can be entered by the operator if required
GAUGE ALARMS - GAUGE ALARM FLAGS	This process variable represents the alarms present in the automatic tank gauge. In order to use this variable the gauge alarms variable must be linked to the alarms information data in the tank gauge. This variable is normally linked to automatic tank gauging systems but can be entered by the operator if required. Possible alarm values depend on the tank gauge in use. You can configure these values. The default gauge alarms are: • 0x01-Scan Failure • 0x02-Gauge I/O Fail • 0x04-Device Alarm • 0x08-Field Cfg Modified • 0x10-Raise Failure • 0x20-Lower Failure • 0x40-Upload Failure • 0x80-Download Failure • 0x100-OverFill

Tank Points - Process Data	
GAUGE ALARMS BIT XX – GAUGE ALARMS	This process variable represents the individual elements of the Gauge Alarm Flags. Where gauge alarms bit 00 represents the state of the lowest bit of the gauge alarm flags and gauge alarms bit 15 represents the highest bit of the gauge alarm flags. Possible values for each gauge alarms bit are Normal or the coded variable associated with the particular bit. In the example above gauge alarms bit 00 – Normal or Scan Failure
TEMP TANK AMBIENT – AMBIENT TANK TEMPERATURE	This process variable is the ambient temperature of the air surrounding the tank. This variable is normally entered by the operator, but can be linked to automatic tank gauging systems. In addition, this variable supports linking to a 'local' FuelsManager database point, this allows multiple tanks to read one common ambient temperature
VOLUME CORRECTION – TANK VOLUME CORRECTION	This process variable is the unmeasurable volume associated with line segments and manifolds connected to the tank. This variable is normally entered by the operator, but can be linked to automatic tank gauging systems to allow remote commands to the tank gauges
VOL. CORRECTION TIME – VOLUME CORRECTION TIME	This process variable is the last time that the tank volume correction was updated. This variable can be viewed from the Operate interface but cannot be modified
VAPOR DENSITY – VAPOR DENSITY	This process variable is the density of the gas in the vapor space above the product in the tank. This variable is normally entered by the operator, but can be linked to automatic tank gauging systems to allow remote commands to the tank gauges. This data is normally only applicable to tanks containing liquified hydrocarbons or tanks using hydrostatic or hybrid tank calculations
VAPOR DENSITY TIME – VAPOR DENSITY TIME	This process variable is the last time that the tank gas density was updated. This variable can be viewed from the Operate interface but cannot be modified
VAPOR PRESS P3 – VAPOR PRESSURE P3	This process variable is the pressure of the vapor space above the product in the tank. This variable is usually measured by automatic tank gauging but can be manually entered by the operator. This data is normally only applicable to tanks containing liquified hydrocarbon or those using hydrostatic or hybrid tank calculations
VAPOR PRESSURE TIME – VAPOR PRESSURE TIME	This process variable is the last time the Vapor Pressure P3 was updated. This variable can be viewed from the Operate interface but cannot be modified. This variable is usually measured by automatic tank gauging but can be manually entered by the operator. This data is normally only applicable to tanks containing liquified hydrocarbon or those using hydrostatic or hybrid tank calculations
MIDDLE PRESSURE P2 – HYDROSTATIC PRESSURE P2	This process variable is the pressure measured at the same known height in the tank, typically at a point such that it is normally below the product level. This variable is usually measured by automatic tank gauging but can be manually entered by the operator. This data is normally only applicable to tanks containing liquified hydrocarbon or those using hydrostatic or hybrid tank calculations
BOTTOM PRESSURE P1 – HYDROSTATIC PRESSURE P1	This process variable is the pressure measured at the bottom of the tank, typically of a point that is always below the lowest possible product level. This variable is usually measured by automatic tank gauging but can be manually entered by the operator. This data is normally only applicable to tanks containing liquified hydrocarbon or those using hydrostatic or hybrid tank calculations

Tank Points - Process Data	
AIR DENSITY – AIR DENSITY	This process variable is the density of the air surrounding the tank. This variable is usually measured by automatic tank gauging but can be manually entered by the operator. This data is normally only applicable to tanks containing liquified hydrocarbon or those using hydrostatic or hybrid tank calculations
MASS FLOW – MASS FLOW	This process variable is the mass flow of product into or out of the tank. FuelsManager normally calculates this sampling the mass at user-defined intervals and averaging the change in mass over a user-defined number of samples. However, this value can also be measured by automatic tank gauging systems or manually entered by the operator
MASS FLOW TIME – MASS FLOW TIME	This process variable is the last time that the tank mass flow was updated. This variable can be viewed from the Operate interface but cannot be modified
NET FLOW – NET FLOW	This process variable is the net volumetric flow of product into or out of the tank. FuelsManager normally calculates this sampling the net volume at user-defined intervals and averaging the change in net volume over a user-defined number of samples. However, this value can also be measured by automatic tank gauging systems or manually entered by the operator
NET FLOW TIME – NET FLOW TIME	This process variable is the last time that the tank Net flow was updated. This variable can be viewed from the Operate interface but cannot be modified
VAPOR MASS – VAPOR MASS	This process variable is the mass of the vapor space above the product in the tank. FuelsManager normally calculates this value. However, the value can also be measured by automatic tank gauging systems or manually entered
VAPOR NET VOLUME – VAPOR NET VOLUME	This process variable is the net volume of vapor space above the product in the tank. FuelsManager normally calculates this value. However, the value can also be measured by automatic tank gauging systems or manually entered
LIQUID MASS	This process variable is the mass of the liquid of the product in the tank. FuelsManager normally calculates this value. However, the value can also be measured by automatic tank gauging systems or manually entered
TOTAL NET VOLUME	This process variable is the total net volume of the product in the tank. FuelsManager normally calculates this value. However, the value can also be measured by automatic tank gauging systems or manually entered
FASTSCAN COMMAND	This process variable allows the operator to choose the timing of the communications for a particular gauge. The possible values are enabled or disabled. When enabled the timing is dependent of the type of gauge
FASTSCAN STATUS	This process variable displays the current FASTSCAN status (gauge communications) either enabled or disabled

Product Transfer Data

Product Transfer Data	
TRANSFER MODE - TANK TRANSFER MODE	This process variable is the mode by which the operator wants to transfer product to/ from tank, possible values are inactive, by volume, by level, or by differential volume. This variable is used as part of the tank transfer feature and as part of the Product Movement System (option). This variable is normally entered by the operator, but can be linked to automatic tank gauging systems to allow remote setting of the transfer mode
TANK COMMAND - TANK MODE COMMAND OUTPUT	This process variable is the desired mode of operation of the tank, possible values are stop, fill, empty, run, test, reset, or out of service. This variable is used by the tank point to enable tank mode alarms. For example, if the tank mode is Stop (and the product movement alarms are enabled) and the level changes, then activate an illegal movement alarm. This variable is normally entered by the operator, but can be linked to automatic tank gauging systems to allow remote setting of the mode or can be calculated by FuelsManager based on the flow process variable
TANK STATUS - CURRENT TANK MODE	This process variable reflects the selected mode of operation of the tank, possible values are stopped, filling, emptying, running, testing, or disabled. This variable always reflects the selected tank mode regardless data source selection
TRANSFER STATUS - TANK TRANSFER STATUS	This process variable reflects the current state of the tank transfer, possible values are Inactive, Trans SD Setpoint, In Progress, Advisory or Complete. The value is intended to represent the various steps in the transfer process. This variable always reflects the current state of the tank transfer regardless data source selection
TRANS SD SETPOINT - TRANSFER SHUTDOWN SETPOINT	This variable is the operator entered desired ending point of a tank transfer, it is automatically expressed in either volume of level units depending on the transfer mode selected
TRANS ADV. SETPOINT - TRANSFER ADVISORY SETPOINT	This variable is the amount of time before a transfer is complete that an advisory alarm should be triggered. The value can be from 0-120 minutes before the transfer reaches the Transfer Shutdown Setpoint
TRANSFER UNITS - TRANSFER SHUTDOWN SP UNITS	This variable is the units being used for the currently active transfer. The units are dependant on the transfer mode selected (i.e. Xfr by Level - Tank Level Units; Xfr by Diff Vol - Tank Volume units)
TRANSFER VOLUME - CURRENT VOLUME TRANSFERRED	This variable is the amount of volume transferred into or out of a tank during the tank transfer, or the amount transferred thus far if a transfer is active
TRANSFER TOTAL - CURRENT TRANSFERRED BASED ON MODE	This variable is the amount of volume / level / mass transferred into or out of a tank during the tank transfer, or the amount transferred thus far if a transfer is active. Units are based on the selected transfer mode
TRANSFER MASS - CURRENT MASS TRANSFERRED	This variable is the amount of mass transferred into or out of a tank during the tank transfer, or the amount transferred thus far if a transfer is active
TRANSFER TIME REMAIN - REMAINING TIME TO FILL OR EMPTY	This variable is the time left to complete an active transfer, based on the amount left to transfer, and the current flow rate
TRANSFER START TIME - TIME AT WHICH TRANSFER BEGAN	This variable is the time at which a currently active transfer started. If no transfer is active this variable displays the time that the last transfer was started

Product Transfer Data	
TRANSFER COMPLETE TIME - TRANSFER FINISH TIME	This variable is the time at which a last product transfer ended
TRANSFER LEVEL SETPOINT - TRANSFER LEVEL SETPOINT	This variable is the current level shutdown setpoint. If no transfer is active this variable displays the level shutdown setpoint for the last transfer
TRANSFER VOL SETPOINT - TRANSFER FINAL VOLUME SP	This variable is the current volume shutdown setpoint. If no transfer is active this variable displays the volume shutdown setpoint for the last transfer
TRANSFER DIFF VOL SP - TRANSFER DIFF. VOLUME SP	This variable is the current differential volume shutdown setpoint. If no transfer is active this variable displays the differential volume shutdown setpoint for the last transfer
TRANSFER MASS SETPOINT - TRANSFER MASS SETPOINT	This variable is the current mass shutdown setpoint. If no transfer is active this variable displays the mass shutdown setpoint for the last transfer
TRANSFER DIFF MASS SP - TRANSFER DIFF. MASS SP	This variable is the current differential mass shutdown setpoint. If no transfer is active this variable displays the differential mass shutdown setpoint for the last transfer
TRANSFER REMAINING - TRANSFER REMAINING BASED ON MODE	This variable is the amount of product that remains to be transferred for the currently active transfer. Units are based on the currently selected transfer mode
MASS TRANSFER REM - TRANSFER REMAINING MASS	This variable is the amount of product, expressed in mass units, that remains to be transferred for the currently active transfer

Tank Alarms Data

Tank Alarms Data	
LEVEL ALARM - COMPOSITE LEVEL ALARM STATUS	This variable is a composite value that displays a coded variable representing the highest priority level alarms for the tank. Possible values are Normal, High-High Low, Low-Low. FuelsManager calculates this alarm based on the current level and the alarms limits configured for the tank
LEVEL HIHI LIMIT - CURRENT HI_HI LEVEL LIMIT	This variable is the limit for a High-High level alarm. If the tank level exceeds the HiHi Alarm value, then a High-High alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
LEVEL HIGH LIMIT - CURRENT HIGH LEVEL LIMIT	This variable is the limit for a High level alarm. If the tank level exceeds the High Alarm value, then a High alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
LEVEL LOW LIMIT - CURRENT LOW LEVEL LIMIT	This variable is the limit for a Low level alarm. If the tank level falls below the Low Alarm value, then a Low alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
LEVEL LOLO LIMIT - CURRENT LO-LO LEVEL LIMIT	This variable is the limit for a Low-Low level alarm. If the tank level falls below the LoLo Alarm value, then a Low-Low alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
LEVEL LOLO LIMIT - CURRENT LO-LO LEVEL LIMIT	This variable is the limit for a Low-Low level alarm. If the tank level falls below the LoLo Alarm value, then a Low-Low alarm is activated

Tank Alarms Data	
LEVEL ALARM HOLDOFF	This variable is the sometimes known as deadband or hysteresis. It is the amount by which the alarm limit must be cleared before the alarm is deactivated. For example, if the High level alarm setpoint is 10 and the level alarm holdoff is 1, the level must return to a value of 9 before the High level alarm is deactivated. This variable is entered when configuring the tank point and cannot be modified from Operate
ETA ALARMS	Estimated Time of Arrival alarms (ETA) are intended to give the operator a warning a preset time before the relevant level alarm is reached. This type of alarm is commonly used in facilities where the tanks are always filled or emptied to high or low levels. Since the filling or emptying of large tanks can take days, these are alarms are used to alert the operator that a particular tank is approaching a level where some action needs to be taken. By default, ETA alarms disabled, they can be enabled via the Alarms tab of the tank configuration window
LEVEL HIHI ETA - HIGH HIGH LEVEL ETA	This variable is the estimated time to arrive at the High-High level alarm setpoint based on the current flow rate. The alarm is activated when the time remaining before reaching the High-High level setpoint is less than the advisory limit defined by the Trans. Adv. Setpoint (see Product Transfer Data section)
LEVEL HIGH ETA - HIGH LEVEL ETA	This variable is the estimated time to arrive at the High level alarm setpoint based on the current flow rate. The alarm is activated when the time remaining before reaching the High level setpoint is less than the advisory limit defined by the Trans. Adv. Setpoint (see Product Transfer Data section)
LEVEL LOW ETA - LOW LEVEL ETA	This variable is the estimated time to arrive at the Low level alarm setpoint based on the current flow rate. The alarm is activated when the time remaining before reaching the Low level setpoint is less than the advisory limit defined by the Trans. Adv. Setpoint (see Product Transfer Data section)
LEVEL LOLO ETA - LOW LOW LEVEL ETA	This variable is the estimated time to arrive at the Low-Low level alarm setpoint based on the current flow rate. The alarm is activated when the time remaining before reaching the Low-Low level setpoint is less than the advisory limit defined by the Trans. Adv. Setpoint (see Product Transfer Data section)
TEMPERATURE ALARM - COMPOSITE TEMP. ALARM STATUS	This variable is a composite value that displays a coded variable representing the highest priority temperature alarms for the tank. Possible values are Normal, High-High, High, Low, Low-Low. This alarm is calculated by FuelsManager based on the current temperature and the alarms limits configured for the tank
TEMP HIHI LIMIT - CURRENT HI-HI TEMP LIMIT	This variable is the limit for a High-High temperature alarm. If the tank temperature exceeds the HiHi Alarm value, then a High-High alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
TEMP HIGH LIMIT - CURRENT HIGH TEMP LIMIT	This variable is the limit for a High temperature alarm. If the tank temperature exceeds the High Alarm value, then a High alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
TEMP LOW LIMIT - CURRENT LOW TEMP LIMIT	This variable is the limit for a Low temperature alarm. If the tank temperature falls below the Low Alarm value, then a Low alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges

Tank Alarms Data	
TEMP LOLO LIMIT - CURRENT LO-LO TEMP LIMIT	This variable is the limit for a Low-Low temperature alarm. If the tank temperature falls below the LoLo Alarm value, then a Low-Low alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
TEMPERATURE ALARM HOLDOFF	This variable is the sometimes known as deadband or hysteresis. It is the amount by which the alarm limit must be cleared before the alarm is deactivated. For example, if the High temperature alarm setpoint is 10 and the temperature alarm holdoff is 1, the temperature must return to a value of 9 before the High temperature alarm is deactivated. This variable is entered when configuring the tank point and cannot be modified from Operate
DENSITY ALARM - COMPOSITE DENISTY ALARM	This variable is a composite value that displays a coded variable representing the highest priority density alarms for the tank. Possible values are Normal, High or Low. FuelsManager calculates this alarm based on the current density and the alarms limit configured for the tank point
DENSITY HIGH LIMIT - CURRENT HIGH DENSITY LIMIT	This variable is the limit for a High density alarm. If the tank density exceeds the High Alarm value, then a High alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
DENSITY LOW LIMIT - CURRENT LOW DENSITY LIMIT	This variable is the limit for a Low density alarm. If the tank density falls below the Low Alarm value, then a Low alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
DENSITY ALARM HOLDOFF	This variable is the sometimes known as deadband or hysteresis. It is the amount by which the alarm limit must be cleared before the alarm is deactivated. For example, if the High density alarm setpoint is 10 and the density alarm holdoff is 1, the density must return to a value of 9 before the High density alarm is deactivated. This variable is entered when configuring the tank point and cannot be modified from Operate
FLOW ALARM - COMPOSITE FLOW ALARM	This variable is a composite value that displays a coded variable representing the highest priority flow alarms for the tank. Possible values are Normal, High or Low. FuelsManager calculates this alarm based on the current flow and the alarm limits configured for the tank
FLOW HIGH LIMIT - CURRENT HIGH FLOW LIMIT	This variable is the limit for a High flow alarm. If the tank flow exceeds the High Alarm value, then a High alarm is activated. Please note that FuelsManager compares the value of the flow variable regardless of it's sign, meaning that a flow of -10000 gpm would trigger a high flow alarm if the High flow limit was 9999. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
FLOW LOW LIMIT - CURRENT LOW FLOW LIMIT	This variable is the limit for a Low flow alarm. If the tank flow falls below the Low Alarm value, then a Low alarm is activated. Please note that FuelsManager compares the value of the flow variable regardless of it's sign, meaning that a flow of -10000 gpm would trigger a high flow alarm if the High flow limit was 9999. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges

Tank Alarms Data	
FLOW ALARM HOLDOFF	This variable is the sometimes known as deadband or hysteresis. It is the amount by which the alarm limit must be cleared before the alarm is deactivated. For example, if the High flow alarm setpoint is 10 and the flow alarm holdoff is 1, the flow must return to a value of 9 before the High flow alarm is deactivated. This variable is entered when configuring the tank point and cannot be modified from Operate
LEVEL RATE ALARM - CHANGE IN LEVEL RATE ALARM	This variable is a composite value that displays a coded variable representing the highest priority level rate alarms for the tank. Possible values are Normal, High or Low. FuelsManager calculates this alarm based on the current level rate and the alarm limits configured for the tank
LEVEL RATE HIGH S.P - HIGH LEVEL RATE SETPOINT	This variable is the limit for a High level rate alarm. If the tank level rate exceeds the High Alarm value, then a High alarm is activated. Please note that FuelsManager compares the value of the level rate variable regardless of it's sign, meaning that a level rate of -10 in/min would trigger a high level rate alarm if the High level rate limit was 9. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
LEVEL RATE LOW S.P. - LOW LEVEL RATE SETPOINT	This variable is the limit for a Low level rate alarm. If the tank level rate falls below the Low Alarm value, then a Low alarm is activated. Please note that FuelsManager compares the value of the level rate variable regardless of it's sign, meaning that a level rate of -10 in/min would trigger a high level rate alarm if the High level rate limit was 9. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
LEVEL RATE ALARM HOLDOFF	This variable is the sometimes known as deadband or hysteresis. It is the amount by which the alarm limit must be cleared before the alarm is deactivated. For example, if the High level rate alarm setpoint is 10 and the level rate alarm holdoff is 1, the level rate must return to a value of 9 before the High level rate alarm is deactivated. This variable is entered when configuring the tank point and cannot be modified from Operate
PRESS VAPOR ALARM - VAPOR PRESSURE ALARM	This variable is a composite value that displays a coded variable representing the highest priority pressure alarms for the tank. Possible values are Normal, High or Low. FuelsManager calculates this alarm based on the current vapor pressure and the alarm limits configured for the tank
PRESS HIGH SETPOINT - HIGH PRESSURE SETPOINT	This variable is the limit for a High pressure alarm. If the tank pressure exceeds the High Alarm value, then a High alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
PRESS LOW SEPOINT - LOW PRESSURE SETPOINT	This variable is the limit for a Low pressure alarm. If the tank pressure falls below the Low Alarm value, then a Low alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
PRESSURE ALARM HOLDOFF	This variable is the sometimes known as deadband or hysteresis. It is the amount by which the alarm limit must be cleared before the alarm is deactivated. For example, if the High pressure alarm setpoint is 10 and the pressure alarm holdoff is 1, the pressure must return to a value of 9 before the High pressure alarm is deactivated. This variable is entered when configuring the tank point and cannot be modified from Operate

Tank Alarms Data	
MOVEMENT ALARM	This variable is used to detect illegal product movements. If the tank command mode is 'Stopped' and the level moves, in either direction, by more than the Movement High limit a 'Movement Alarm' is activated. By default the movement alarm is based on change in product level, by editing the registry value: HKEY_LOCAL_MACHINE\SOFTWARE\FuelsManager\DataManager \ UseNetVolumeForMvmntAlarm such that the value equals 1. The movement alarm behavior will be based on change in Net Std. Volume, thus eliminating false alarm caused by product temperature changes. This variable is entered when configuring the tank point and cannot be modified from Operate
MOVEMENT HOLDOFF - MOVEMENT HOLDOFF TIME	This variable is the amount of time (in seconds) by which the level (or Net Std. volume) must exceed the Movement alarm high limit before an alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
REVERSE FLOW ALARM	This variable is used to detect product movements in the opposite direction to the selected tank command mode. If the tank command mode is 'Filling' and the level falls then a 'Reverse Flow Alarm' is activated
REVERSE FLOW HOLDOFF - REVERSE FLOW HOLDOFF TIME	This variable is the amount of time (in seconds) by which the reverse flow condition must exist before an alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
NO FLOW ALARM	This variable is used to detect that product movement has stopped unexpectedly. If the tank command mode is 'Filling' or 'Emptying' and the flow value is zero then a No Flow Alarm' is activated
NO FLOW HOLDOFF - NO FLOW HOLDOFF TIME	This variable is the amount of time (in minutes) by which the no flow condition must exist before an alarm is activated. This variable is entered when configuring the tank point, but can be modified from Operate by a user with sufficient privileges
TEST MODE ALARM	This variable is used to generate an alarm if the tank command mode is selected to be 'Test'. The tank mode can be commanded to 'Test' mode, this is used by the operator in order to disable all level alarms, typically used during tank gauge maintenance. Enabling the Test Mode alarm ensures that an operator alarm will be generated when the test mode is selected, thereby ensuring the mode is not selected accidentally.
LEAK RATE	This variable shows the statistically calculated rate of leakage from a specific tank
LEAK DATA	Allows an Enable/Disable State. This alarm, when enabled, will alert every day at 12:00 AM to notify the operator that there is not enough valid data or quiet time data from the configured tank to produce a valid Leak Test Report

Tank Alarms Data	
DIGITAL ALARMS – STANDARD TANK ALARM FLAGS	This variable is the current standard digital alarm statuses associated with the Tank. Available status are: • 0x1–DB Config Error • 0x2–Tank Calc Error • 0x4–Strap Error • 0x8–API Corr Error • 0x10–Critical Zone • 0x20–Movement Alarm • 0x40–Reverse Flow • 0x80–No Flow • 0x100–ETA HiHi Level • 0x200–ETA High Level • 0x400–ETA LoLo Level • 0x800–ETA Low Level • 0x2000–Testing • 0x4000–Trans Adv SetPt • 0x8000–Trans SD SetPt
TANK MODE ALARM – COMPOSITE TANK MODE ALARM	This variable is a composite value that displays a coded variable representing the highest priority tank mode alarms for the tank. Possible values are Normal, Movement Alarm, No Flow, Reverse Flow or Testing. FuelsManager calculates this alarm based on the current product movement of the tank and the currently operator selected tank mode
ALARM API CORRECTION – API CORRECTION ERROR	This variable is a coded variable value that displays a status of either Normal or API Corr Error if the Density or Temperature is outside of the range for the selected volume correction method
ALARM CALCULATION – CALCULATION ERROR	This variable is a coded variable value that displays a status of either Normal or Tank Calc Error if FuelsManager is unable to perform the tank volume calculation due to an internal error
ALARM CRITICAL ZONE – LEVEL IN CRITICAL ZONE	This variable is a coded variable value that displays a status of either Normal or Critical Zone if the current tank level is between the Fully Floating and Fully Landed heights
ALARM DAtabASE CONF – DAtabASE CONFIGURATION ERROR	This variable is a coded variable value that displays a status of either Normal or DB Config Error if FuelsManager is unable to perform operation for this tank due to an internal configuration error
ALARM ETA HIGH LEVEL – HIGH LEVEL ETA ALARM	This variable is a coded variable value that displays a status of either Normal or ETA High Level if the ETA High level alarm is active (see above for details of ETA alarms)
ALARM ETA HIHI LEVEL – HIGH HIGH LEVEL ETA ALARM	This variable is a coded variable value that displays a status of either Normal or ETA HiHi Level if the ETA High–High level alarm is active (see above for details of ETA alarms)
ALARM ETA LOLO LEVEL – LOW LOW LEVEL ETA ALARM	This variable is a coded variable value that displays a status of either Normal or ETA LoLo Level if the ETA Low–Low level alarm is active (see above for details of ETA alarms)
ALARM ETA LOW LEVEL – LOW LEVEL ETA ALARM	This variable is a coded variable value that displays a status of either Normal or ETA Low Level if the ETA Low level alarm is active (see above for details of ETA alarms)
ALARM MOVEMENT – FLOW (LEVEL CHANGE)	This variable is a coded variable value that displays a status of either Normal or Movement Alarm if the Movement Alarm is active (see above for details of the Movement Alarm)

Tank Alarms Data	
ALARM NO FLOW – NO FLOW	This variable is a coded variable value that displays a status of either Normal or No Flow if the No Flow alarm is active (see above for details of the No Flow Alarm)
ALARM REVERSE FLOW – REVERSE PRODUCT FLOW	This variable is a coded variable value that displays a status of either Normal or Reverse Flow if the Reverse Flow alarm is active (see above for details of the Reverse Flow Alarm)
ALARM TANK IN TEST – TANK IN TEST MODE ALARM	This variable is a coded variable value that displays a status of either Normal or Testing if the tank mode has been set to Test by the operator. (see above for details of the Test Mode alarm)
ALARM XFR ADVISORY – TRANSFER ADVISORY ALARM	This variable is a coded variable value that displays a status of either Normal or Trans Adv SetPt if the current tank transfer has reached the Transfer Advisory setpoint
ALARM XFR SHUTDOWN – TRANSFER SHUTDOWN ALARM	This variable is a coded variable value that displays a status of either Normal or Trans SD SetPt if the current tank transfer has reached the Transfer Shutdown setpoint

Scaling and engineering units data

Scaling and Engineering Units Data	
VARIABLE TYPE	FuelsManager variables are divided into eleven types, for each type of variable you can configure the range of the data and the engineering units. The range and engineering units are configured via the General tab of the tank configuration window. The range information is used as the default minimum / maximum values for display objects like bar graphs and trends, in addition to the minimum / maximum values for operator command windowes
LEVEL MININIUM - TANK MINIMUM LEVEL SCALING	This variable is the minimum range for the level, water level, solids level, and gauge position process variables. This variable can be viewed from the Operate interface but cannot be modified
LEVEL MAXIMIUM - TANK MAXIMUM LEVEL SCALING	This variable is the maximum range for the level, water level, solids level, and gauge position process variables. This variable can be viewed from the Operate interface but cannot be modified
LEVEL MININIUM EMPTY - MINIMUM TANK EMPTY LEVEL	This variable is the minimum level to which the tank can be safely drained. This variable is entered when configuring the tank point, it can viewed but cannot be modified via Operate
LEVEL MAXIMUM FILL - MAXIMUM TANK FILL LEVEL	This variable is the maximum level to which the tank can be safely filled. This variable is entered when configuring the tank point, it can be viewed but cannot be modified via Operate
LEVEL UNITS - LEVEL ENGINEERING UNITS	This variable is the engineering units for the level, water level, solids level, and gauge position process variables. This variable can be viewed from the Operate interface but cannot be modified
TEMPERATURE MININIUM - TANK MINIMUM TEMP SCALING	This variable is the minimum range for the tank temperature, ambient temperature, and vapor temperature process variables. This variable can be viewed from the Operate interface but cannot be modified
TEMPERATURE MAXIMIUM - TANK MAXIMUM TEMP SCALING	This variable is the maximum range for the tank temperature, ambient temperature and vapor temperature process variables. This variable can be viewed from the Operate interface but cannot be modified
TEMPERATURE UNITS- TEMPERATURE ENGINEERING UNITS	This variable is the engineering units for the tank temperature, ambient temperature and vapor temperature process variables. This variable can be viewed from the Operate interface but cannot be modified
VOLUME MININIUM - TANK MINIMUM VOLUME SCALING	This variable is the minimum range for all tank volume process variables. This variable can be viewed from the Operate interface but cannot be modified
VOLUME MAXIMIUM - TANK MAXIMUM VOLUME SCALING	This variable is the maximum range for all tank volume process variables. This variable can be viewed from the Operate interface but cannot be modified
VOLUME UNITS - VOLUME ENGINEERING UNITS	This variable is the engineering units for all tank volume process variables. This variable can be viewed from the Operate interface but cannot be modified
MASS MININIUM - TANK MINIMUM MASS SCALING	This variable is the minimum range for all tank mass process variables. This variable can be viewed from the Operate interface but cannot be modified
MASS MAXIMIUM - TANK MAXIMUM MASS SCALING	This variable is the maximum range for all tank mass process variables. This variable can be viewed from the Operate interface but cannot be modified
MASS UNITS - MASS ENGINEERING UNITS	This variable is the engineering units for all tank mass process variables. This variable can be viewed from the Operate interface but cannot be modified

Scaling and Engineering Units Data	
DENSITY MININIUM – TANK MINIMUM DENSITY SCALING	This variable is the minimum range for the tank observed density process variable. This variable can be viewed from the Operate interface but cannot be modified
DENSITY MAXIMIUM – TANK MAXIMUM DENSITY SCALING	This variable is the maximum range for the tank observed density process variable. This variable can be viewed from the Operate interface but cannot be modified
DENSITY UNITS – DENSITY ENGINEERING UNITS	This variable is the engineering units for the tank observed density process variable. This variable can be viewed from the Operate interface but cannot be modified
DENSITY STD MININIUM – TANK MINIMUM STD DENSITY SCALING	This variable is the minimum range for the tank corrected density process variable. This variable can be viewed from the Operate interface but cannot be modified
DENSITY STD MAXIMIUM – TANK MAXIMIUM STD DENSITY SCALING	This variable is the maximum range for the tank corrected density process variable. This variable can be viewed from the Operate interface but cannot be modified
STD DENSITY UNITS – STANDARD DENSITY UNITS	This variable is the engineering units for the tank corrected density process variable. This variable can be viewed from the Operate interface but cannot be modified
FLOW MININIUM – TANK MINIMUM FLOW SCALING	This variable is the minimum range for the tank flow process variable. This variable can be viewed from the Operate interface but cannot be modified
FLOW MAXIMIUM – TANK MAXIMUM FLOW SCALING	This variable is the maximum range for the tank flow process variable. This variable can be viewed from the Operate interface but cannot be modified
FLOW UNITS – FLOW ENGINEERING UNITS	This variable is the engineering units for the tank flow process variable. This variable can be viewed from the Operate interface but cannot be modified
PRESS. VAPOR MININIUM – TANK MINIMUM VAPOR PRESSURE SCALING	This variable is the minimum range for the tank vapor pressure process variable. This variable can be viewed from the Operate interface but cannot be modified
PRESS. VAPOR MAXIMIUM – TANK MAXIMIUM VAPOR PRESSURE SCALING	This variable is the maximum range for the tank vapor pressure process variable. This variable can be viewed from the Operate interface but cannot be modified
PRESS VAPOR UNITS – VAPOR PRESSURE UNITS	This variable is the engineering units for the tank vapor pressure process variable. This variable can be viewed from the Operate interface but cannot be modified
LEVEL RATE MININIUM – TANK MINIMUM LEVELRATE SCALING	This variable is the minimum range for the tank level change rate process variable. This variable can be viewed from the Operate interface but cannot be modified
LEVEL RATE MAXIMIUM – TANK MAXIMIUM LEVELRATE SCALING	This variable is the maximum range for the tank level change rate process variable. This variable can be viewed from the Operate interface but cannot be modified
LEVEL RATE UNITS – RATE OF LEVEL CHANGE UNITS	This variable is the engineering units for the tank level change rate process variable. This variable can be viewed from the Operate interface but cannot be modified
MASS FLOW MININIUM – TANK MINIMUM MASS FLOW SCALING	This variable is the minimum range for the tank mass flow process variable. This variable can be viewed from the Operate interface but cannot be modified
MASS FLOW MAXIMIUM – TANK MAXIMUM MASS FLOW SCALING	This variable is the maximum range for the tank mass flow process variable. This variable can be viewed from the Operate interface but cannot be modified
MASS FLOW UNITS – MASS FLOW UNITS	This variable is the engineering units for the tank mass flow process variable. This variable can be viewed from the Operate interface but cannot be modified

Scaling and Engineering Units Data	
VAPOR DENSITY MININIUM – TANK MINIMUM GAS DENSITY	This variable is the minimum range for the tank gas density process variable. This variable can be viewed from the Operate interface but cannot be modified
VAPOR DENSITY MAXIMIUM – TANK MAXIMUM GAS DENSITY	This variable is the maximum range for the tank gas density process variable. This variable can be viewed from the Operate interface but cannot be modified
VAPOR DENSITY UNITS – GAS DENSITY UNITS	This variable is the engineering units for the tank gas density process variable. This variable can be viewed from the Operate interface but cannot be modified
LEAK RATE MINIMUM – TANK MINIMUM LEAK RATE	This variable sets the minimum leak rate that is detectable when running leak detection tests
LEAK RATE MAXIMUM – TANK MAXIMUM LEAK RATE	This variable sets the maximum leak rate that is allowed when running leak detection tests. Any rate above this will result in an alarm (if configured) and the printing of the word 'FAILED' on leak reports
LEAK RATE UNITS – LEAK RATE UNITS	This variable sets the volumetric engineering units that is used during leak detection

Tank configuration data

Tank Configuration Data	
DETAIL	This parameter defines which tank detail template is to be displayed for this particular tank. If this value is not defined, FuelsManager will use the tank detail template defined in the registry key: HKEY_LOCAL_MACHINE\SOFTWARE\FuelsManager\Detail\Tank
CORRECTION TYPE	These two parameters define the volume correction method to be used in the calculation of Std. Density and Net Std. Volume. The selection made in the first parameter constrains the available options in the second parameter. For example, if you select API°C, the second parameter is constrained to American Petroleum Institute tables that are valid for temperatures expressed in °C.
STD TEMPERATURE	This parameter defines the temperature to which the gross volume value will be corrected. The majority of the correction types define the standard temperature, for these types this field is for display only
K0 - K5	These parameters are only visible when the correction type 'polynomial' is selected, these parameters define the constants to be used in the polynomial calculation
ALPHA	This parameter is available when an American Petroleum Institute table of type C (table 54C or table 6C) or a Japan Chemical table is selected. This parameter defines the thermal co-efficient of expansion to be used in the volume correction method
VCF ROUNDING	This parameter is only available when a Japanese correction type is selected. The rounding options are None, 0.0001, and 0.000001 and are applied to the Volume Correction Factor before all calculations are performed
LEVEL ROUNDING	This parameter is only available when a Japanese correction type is selected. The rounding options are None and Nearest Integer. Level rounding is applied to the product level before performing each volume calculation
TEMPERATURE ROUNDING	This parameter is only available when a Japanese correction type is selected. The rounding options are None, 0.25, and 0.5. Temperature rounding is applied to the product temperature before performing each volume calculation
WATER SUBTRACTION	This parameter is only available when a Japanese correction type is selected. The water subtraction options are None, Gross Volume, and Net Volume. This parameter defines the method of Water Volume compensation. Water Volume is either; not subtracted; subtracted in the calculation of Gross Volume; or subtracted in the calculation of Net Volume, respectively
VSW SUBTRACTION	This parameter is only available when a Japanese correction type is selected. The VSW subtraction options are None, Gross Volume, and Net Volume. VSW is defined as the Volume associated with the percent BSW (Bottoms Sediment and Water). This parameter defines the method of VSW compensation. VSW is either; not subtracted; subtracted in the calculation of Gross Volume; or subtracted in the calculation of Net Volume, respectively.
NET MASS	This parameter is only available when a Japanese correction type is selected. The Net Mass options are Mass, Weight, Weight in a Pressure Tank, Idemitsu, and Food Oil. This parameter defines the method of Weight calculation
MOLE CONSTANT	This parameter is only available when Idemitsu is selected for the Net Mass calculation. This parameter defines the Mole Constant value used in the Idemitsu weight calculation

Tank Configuration Data	
SAMPLES	This parameter is used, along with the 'Sample Time' and 'Deadband' parameters, in the averaging calculation of Flow, Level Rate, Mass Flow, and Net Flow. It defines the amount of samples to be included in the average. The same Sample parameter is used for Flow, Level Rate, Mass Flow, and Net Flow calculations
SAMPLE TIME	This parameter is used, along with the 'Samples' and 'Deadband' parameters, in the averaging calculation of Flow, Level Rate, Mass Flow, and Net Flow. It defines the amount of time, in seconds, between the samples in the average. The same Sample Time parameter is used for the Flow, Level Rate, Mass Flow, and Net Flow calculations
DEADBAND	This parameter is used, along with the 'Samples' and Sample Time' parameters, in the averaging calculation of Flow, Level Rate, Mass Flow, and Net Flow. The sample value must be greater than the deadband value otherwise a sample value of zero will be used. The deadband parameter can be set independently for the Flow, Level Rate, Mass Flow, and Net Flow calculations
FILTER	This parameter is used, to enable the averaging calculation of Flow, Level Rate, Mass Flow, and Net Flow. If the filter parameter is not set, FuelsManager calculates the instantaneous value for the Flow, Level Rate, Mass Flow, and Net Flow values. Averaging can be set independently for the Flow, Level Rate, Mass Flow, and Net Flow calculations
LANDED HEIGHT	This parameter defines the height at which the floating roof is fully landed on it legs. At this point the volumetric effect of the floating roof is zero, since it is no longer floating. The area between the Landed Height and the Floating Height is known as the 'Critical Zone'. FuelsManager only uses this parameter if the Roof type, Roof Mass not in Strap is selected, otherwise this parameter is ignored
FLOATING HEIGHT	This parameter defines the height at which the floating roof is fully floating on the product. At this point, the full volumetric effect of the floating roof is applied to the volume calculations. The area between the Landed Height and the Floating Height is known as the 'Critical Zone'. FuelsManager only uses this parameter if the Roof type, Roof Mass not in Strap is selected, otherwise this parameter is ignored
ROOF MASS	This parameter defines the weight of the floating roof, this value is used together with the Roof Type selection, current density and strapping density to calculate the volumetric effect of the floating roof

Tank Configuration Data	
ROOF TYPE	This parameter defines the type of floating roof, possible values are: • No Tank Roof – no floating roof correction. • Fixed Roof – no floating roof correction. • Roof Mass in Strap – roof mass is accounted for in the tank strapping table. FuelsManager corrects the roof volume to compensate for the difference between the current product density and the density of the product when the tank strapping table was created. • Roof Mass not in Strap – the roof mass has not been included in the tank strapping table. FuelsManager applies the volumetric effect of the roof to the volume correction calculations, in addition to compensating for the difference between the current product density and the density of the product when the tank strapping table was created. • Kaiji-Kentei-Kyyokai see the Tank Calculations chapter for more details. Only available if a 'Japan' Correction Type is selected on the Edit Tank Data Volume tab • Sin-Nihon-Kentei-Kyyoukai1 see the Tank Calculations chapter for more details. Only available if a 'Japan' Correction Type is selected on the Edit Tank Data Volume tab • Sin-Nihon-Kentei-Kyyoukai2 see the Tank Calculations chapter for more details. Only available if a 'Japan' Correction Type is selected on the Edit Tank Data Volume tab • Sin-Nihon-Kentei-Kyyoukai3 see the Tank Calculations chapter for more details. Only available if a 'Japan' Correction Type is selected on the Edit Tank Data Volume tab
TANK GEOMETRY	This parameter defines the shape of the tank. FuelsManager uses this value to determine how to interpolate between strapping points, possible values are: Vert. Cylinder, Horizontal Cylinder – End Caps; Horizontal Cylinder – Flat Ends; Standard Sphere; Polynomial Sphere; Underground – End Caps; and Underground – Flat Ends. Selecting Polynomial Sphere causes the strapping table tab of the tank configuration window to change to 'Polynomial Sphere'
TANK VOLUME	This parameter is used for LPG volume correction methods and defines the total internal volume of the spherical tank
TANK HEIGHT	This parameter is used for LPG volume correction methods and defines the total height of the sphere at the point at which the automatic tank gauge is installed
TANK RADIUS	This parameter is used for LPG volume correction methods and defines the radius of the sphere
SHELL THICKNESS	This parameter is used for LPG volume correction methods and defines the thickness of the sphere's shell
LINING MATERIAL	This piece of data stores the material that the tank is coated with on the inside of the tank
DATE INSTALLED	This variable stores the date that the tank was brought into service

Tank Configuration Data	
TANK MATERIAL	If this parameter defines the material from which the tank shell is constructed. Different materials have different thermal coefficients of expansion and hence expand or contract at different rates. The selection of tank material will effect the calculated tank shell correction factor
TANK SHELL CORRECTION - EXPCOEF	This parameter defines the material expansion coefficient used in the tank shell correction calculations. Manual entry of this value is not allowed except when the Tank Material is set to 'Other'
INSTALL TEMP	This parameter stores the outside ambient temperature when the tank was brought into service
CATHODIC PROTECTION	This variable denotes that this tank is fitted with Cathodic protection--used for reporting and information only
OVERFILL PROTECTION	This variable denotes that this tank is fitted with Overfill protection--used for reporting and information only
SPILL PROTECTION	This variable denotes that this tank is fitted with Cathodic protection--used for reporting and information only
TANK SHELL CORRECTION - ENABLE CORRECTION	If this option is selected FuelsManager compensates the Net Std. volume for the thermal expansion effects of the tank shell. If the option is not selected the Tank Shell Correction factor equals 1, hence no correction
TANK SHELL CORRECTION - SHELL INSULATION	If this option is selected FuelsManager uses the insulated tank correction equation when compensating the Net Std. volume for the thermal expansion effects of the tank shell. If the option is not selected the non-insulated tank correction equation is used
TANK SHELL CORRECTION - AREACOEF	This parameter defines the shell area expansion coefficient used in the tank shell correction calculations. Manual entry of this value is not allowed except when the Tank Material is set to 'Other'
PRESSURE TRANSMITTER SETUP	These parameters define the position of the top, middle, and bottom offsets for the respective pressure transmitters in Hydrostatic/Hybrid calculations
MINIMUM LEVEL	This parameter defines the lowest level of which Hydrostatic Hybrid tank calculations can be performed
DENSITY DEADBAND	This parameter defines the minimum change in density that will cause the Hydrostatic/Hybrid tank calculation to be executed
LOCAL GRAVITY	Enables the entry of the earth's gravity in meters/sec2 at the tank's specific location used in Hydrostatic/Hybrid calculations
ELEVATION	Defines the elevation above sea level at the tank's specific location, used in Hydrostatic/Hybrid calculations
LATITUDE	Defines the Latitude (in deg, mins, sec) of the tank's specific location, used in Hydrostatic/Hybrid calculations
LEVEL OFFSET	Defines the offset value to be applied to the level calculations as part of the Hydrostatic calculations
MAXIMUM FILL	This parameter defines the maximum safe level to which the tank can be filled (see Level Maximum Fill). FuelsManager uses this value in the calculation of remaining and available volume(s). The maximum fill level can be: • User Defined - user can enter any value • High - maximum fill level is the same as the high level alarm limit • High-High - maximum fill level is the same as the high-high level alarm limit Note! Selecting the 'User Defined' option also enables the Maximum Operating limit level alarm. This alarm functions independently of the High and High-High alarms and is intended to give an additional stage of level alarm monitoring

Tank Configuration Data	
MINIMUM EMPTY	This parameter defines the minimum safe level to which the tank can be drained (see Level Minimum Empty). FuelsManager uses this value in the calculation of remaining and available volume(s). The minimum empty level can be: • User Defined – user can enter any value. • Low – minimum empty level is the same as the low level alarm limit • Low–Low – minimum empty level is the same as the low–low level alarm limit
GAUGE TYPE	This parameter defines the type of automatic tank gauge used by this tank. FuelsManager uses this parameter for display only. This parameter can be viewed from the Operate interface but cannot be modified
GAUGE TYPE – MODIFIER	This parameter defines the commands available to the operator for a particular automatic tank gauge. For example,\. Raise / Lower
FLOAT MASS	This parameter is used for LPG volume correction methods where float type automatic tanks gauges are used. It defines the mass of the float, FuelsManager uses this to compensate the level value reported by the tank gauge
FLOAT DENSITY	This parameter is used for LPG volume correction methods where float type automatic tanks gauges are used. It defines the density of the float. FuelsManager uses this to compensate the level value reported by the tank gauge
FLOAT DIAMETER	This parameter is used for LPG volume correction methods where float type automatic tanks gauges are used. It defines the diameter of the float. FuelsManager uses this to compensate the level value reported by the tank gauge
STRAPPING TEMPERATURE	This parameter defines the temperature at which the tank strapping table was made. FuelsManager uses this parameter to correct for roof volume in tanks where the mass of the floating roof has been accounted for in the strapping table but the current temperature differs from that at which the tank was strapped
STRAPPING DENSITY	This parameter defines the density at which the tank strapping table was made. FuelsManager uses this parameter to correct for roof volume in tanks where the mass of the floating roof has been accounted for in the strapping table but the current density differs from that at which the tank was strapped
STRAP TABLE TYPE	This parameter defines whether the strapping table starts at the minimum and increments to the maximum level / volume pair (innage) or starts at the maximum level / volume pair and decrements to the minimum (outage)
STRAP/WATER TABLE MODE	This parameter defines the mode of Strap and Water tables used--Combined or Separated. Combined uses a single table for both water and strap calculations. Separated uses individual tables for strap and water calculations
POLYNOMIAL SPHERE	This parameter enables the special Polynomial Sphere strapping table when selected in Tank Geometry. The Polynomial Sphere strapping table uses a polynomial equation to calculate volume based on level

Input points - process data

Input Points - Process Data	
DESCRIPTION – POINT DESCRIPTION	This process variable is the name by which the input point is known to the user. This variable is entered when configuring the input point, but cannot be modified via Operate
PROCESS VALUE – PROCESS VARIABLE OR SETPOINT	This process variable is the current value of the input point. This variable is usually linked to automatic tank gauging systems, PLC's or DCS systems, but can also be manually entered by the operator
ALARM STATUS – COMPOSITE ALARM STATUS	This variable is a composite value that displays a coded variable representing the highest priority alarm for the input point. Possible values depend on the format of the alarm definition associated with the input point. FuelsManager calculates this alarm based on the current process value and the alarm definition configured for the input point. This variable can be viewed from the Operate interface but cannot be modified
UNITS – ENGINEERING UNITS	This variable is the engineering units of the input point's process variable. This variable is entered when configuring the input point, but cannot be modified via Operate
TIME – TIME OF LAST VALUE UPDATE	This process variable is the last time that the input point's process value was updated. This variable can be viewed from the Operate interface but cannot be modified
TICKS – MILLISECONDS OF LAST UPDATE	This process variable is the number of milliseconds that have elapsed since input point's process value was updated. This variable can be viewed from the Operate interface but cannot be modified
MAXIMUM – MAXIMUM SCALING VALUE	This variable is the maximum range for the input point's process value. This variable is entered when configuring the input point, but cannot be modified via Operate
MINIMUM – MINIMUM SCALING VALUE	This variable is the minimum range for the input point's process value. This variable is entered when configuring the input point, but cannot be modified via Operate

Output points - process data

Output Points - Process Data	
DESCRIPTION – POINT DESCRIPTION	This process variable is the name by which the output point is known to the user. This variable is entered when configuring the output point, but cannot be modified via Operate
OUTPUT – OUTPUT POINT COMMAND	This process variable is the value of the last command issued via this output point. This variable is usually linked to automatic tank gauging systems, PLC's or DCS systems, and is used to send operator commands to field devices (i.e. Open / Close, Start / Stop)
PROCESS VALUE – PROCESS VARIABLE OR SETPOINT	This process variable is the current value of the output point. This variable is usually linked to automatic tank gauging systems, PLC's or DCS systems, but can also be manually entered by the operator
ALARM STATUS – COMPOSITE ALARM STATUS	This variable is a composite value that displays a coded variable representing the highest priority alarm for the output point. Possible values depend on the format of the alarm definition associated with the output point. FuelsManager calculates this alarm based on the current process value and the alarm definition configured for the output point. This variable can be viewed from the Operate interface but cannot be modified

Output Points - Process Data	
UNITS – ENGINEERING UNITS	This variable is the engineering units of the output point's process variable. This variable is entered when configuring the output point, but cannot be modified via Operate
TIME – TIME OF LAST VALUE UPDATE	This process variable is the last time that the output point's process value was updated. This variable can be viewed from the Operate interface but cannot be modified
TICKS – MILLISECONDS OF LAST UPDATE	This process variable is the number of milliseconds that have elapsed since output point's process value was updated. This variable can be viewed from the Operate interface but cannot be modified
MAXIMUM – MAXIMUM SCALING VALUE	This variable is the maximum range for the output point's process value. This variable is entered when configuring the output point, but cannot be modified via Operate
MINIMUM – MINIMUM SCALING VALUE	This variable is the minimum range for the output point's process value. This variable is entered when configuring the output point, but cannot be modified via Operate

Triggered points - process data

Output Points - Process Data	
DESCRIPTION – POINT DESCRIPTION	This process variable is the name by which the output point is known to the user. This variable is entered when configuring the output point, but cannot be modified via Operate
OUTPUT – OUTPUT POINT COMMAND	This process variable is the value of the last command issued via this output point. This variable is usually linked to automatic tank gauging systems, PLC's or DCS systems, and is used to send operator commands to field devices (i.e. Open / Close, Start / Stop)
PROCESS VALUE – PROCESS VARIABLE OR SETPOINT	This process variable is the current value of the output point. This variable is usually linked to automatic tank gauging systems, PLC's or DCS systems, but can also be manually entered by the operator
ALARM STATUS – COMPOSITE ALARM STATUS	This variable is a composite value that displays a coded variable representing the highest priority alarm for the output point. Possible values depend on the format of the alarm definition associated with the output point. FuelsManager calculates this alarm based on the current process value and the alarm definition configured for the output point. This variable can be viewed from the Operate interface but cannot be modified
UNITS – ENGINEERING UNITS	This variable is the engineering units of the output point's process variable. This variable is entered when configuring the output point, but cannot be modified via Operate
TIME – TIME OF LAST VALUE UPDATE	This process variable is the last time that the output point's process value was updated. This variable can be viewed from the Operate interface but cannot be modified
TICKS – MILLISECONDS OF LAST UPDATE	This process variable is the number of milliseconds that have elapsed since output point's process value was updated. This variable can be viewed from the Operate interface but cannot be modified
MAXIMUM – MAXIMUM SCALING VALUE	This variable is the maximum range for the output point's process value. This variable is entered when configuring the output point, but cannot be modified via Operate
MINIMUM – MINIMUM SCALING VALUE	This variable is the minimum range for the output point's process value. This variable is entered when configuring the output point, but cannot be modified via Operate

Units

UNIT TYPE	UNIT NAME	ABREV.	INDEX	Metric	English
Area	Square 16ths of an Inch	16th2	34		
	Square Centimeters	cm2	31		
	Square Feet	ft2	36		ü
	Square Inches	in2	35		
	Square Kilometers	km2	33		
	Square Meters	m2	32	ü	
	Square Miles	mi2	38		
	Square Millimeters	mm2	30		
	Square Yards	yd2	37		
Density	Degrees API	° API	191		
	Degrees Balling	° Balling	198		
	Degrees BRIX	° BRIX	194		
	Degrees Heavy Baume	° Ba (h)	196		
	Degrees Light Baume	° Ba (l)	195		
	Degrees Twaddell	° Tw	197		
	Grams per Cubic Centimeter	g/cm3	180		
	Grams per Cubic Liter	g/L3	182		
	Grams per Cubic Milliliter	g/mL3	181		
	Kilograms per Cubic Liter	kg/L3	184		
	Kilograms per Cubic Meter	kg/m3	183	ü	
	Percent Plato	% Plato	193		
	Pounds per Barrel (Liquid)	lb/bbl (liq)	190		
	Pounds per Barrel (Oil)	lb/bbl (oil)	189		
	Pounds per Cubic Foot	lb/ft3	186		
	Pounds per Cubic Inch	lb/in3	185		
	Pounds per Imperial Gallon	lb/gal (UK)	188		
	Pounds per U.S. Gallon	lb/gal (US)	187		ü
	Short Tons per Cubic Yard	ton(s)/yd3	199		
	Specific Gravity	sp gr	192		

UNIT TYPE	UNIT NAME	ABREV.	INDEX	Metric	English
Dimensionless	Bushel	bushel	244		
	Cycles per Second	Hz	233		
	Parts per Million	PPM	235		
	Percent Humidity	%H	236		
	Percent Oxygen	%O2	237		
	Percentage	%	234		
	pH Factor	pH	239		
	Relative Humidity	RH	238		
	Revolutions Per Minute	RPM	232		
	Centipoise	centp	240		
	Cubic Feet per Pound	ft3/lb	247		
	Percent Steam Quality	%quality	243		
	Percentage of Solids by Volume	%sol-vol	242		
	Percentage of Solids by Weight	%sol-wt	241		
	Proof Mass	pr mass	246		
	Proof Volume	pr vol	245		
Electrical	Amperes	A	223		
	Capacitance (Farad)	F	225		
	Conductance (mho)	mho	230		
	Conductance (Micro-Siemens)	µS	228		
	Conductance (Siemens)	S	229		
	Coulomb	C	226		
	Inductance (Henry)	H	227		
	Milliamps	mA	222		
	Millivolts	mV	220		
	Power Factor	P.F.	231		
	Resistance (Ohms)	ohm	224		
	Volts	V	221		
Energy	British Thermal Unit (IT)	BTU	200		
	Calorie	cal	201		
	Joule	J	202	ü	
	Kilowatt Hour	kWH	204		ü
	Watt Hour	WH	203		

UNIT TYPE	UNIT NAME	ABREV.	INDEX	Metric	English
Length	16ths of an Inch	16th	024		
	Centimeters	cm	021		
	Feet	ft	026		ü
	Feet-in-16th	ft-in-16	027		
	Feet-in-8th	ft-in-8			
	Inches	in	025		
	Kilometers	km	023		
	Meters	m	022	ü	
	Mile (statute)	mi	029		
	Millimeters	mm	020		
	Yard	yd	028		
Mass	English Tons	ton (e)	065		
	Gram	g	060		
	Kilogram	kg	061	ü	
	Long Tons	ton (l)	067		
	Metric Tons	ton (m)	062		
	Ounce	oz	063		
	Pound	lb	064		ü
	Short Tons	ton (s)	066		
	Pounds (thousands)	Mlbs	068		

UNIT TYPE	UNIT NAME	ABREV.	INDEX	Metric	English
Mass Flow Rate	Grams per Hour	g/hr	145		
	Grams per Minute	g/min	144		
	Grams per Second	g/sec	143		
	Kilograms per day	kg/day	149		
	Kilograms per Hour	kg/hr	148		
	Kilograms per Minute	kg/min	147		
	Kilograms per Second	kg/sec	146	ü	
	Long Tons per Day	ton(l)/day	142		
	Long Tons per Hour	ton(l)/hr	141		
	Long Tons per Minute	ton(l)/min	140		
	Metric Tons per Day	ton(m)/day	136		
	Metric Tons per Hour	ton(m)/hour	135		
	Metric Tons per Minute	ton(m)/min	134		
	M pounds per Day				
	M pounds per Hour				
	M pounds per Minute				
	M pounds per Second				
	Pounds per Day	lb/day	133		
	Pounds per Hour	lb/hr	132		
	Pounds per Minute	lb/min	131		
	Pounds per Second	lb/sec	130		ü
	Short Tons per Day	ton(s)/day	139		
	Short Tons per Hour	ton(s)/hr	138		
	Short Tons per Minute	ton(s)/min	137		
Power/Heat Transfer	BTU (IT) per Hour	BTU/hr	212		
	BTU (IT) per Minute	BTU/min	211		
	BTU (IT) per Second	BTU/sec	210		
	Calories per Minute	cal/min	213		
	Horsepower	HP	217		ü
	KiloVolt-Ampere	kVA	216		
	Kilowatt	kW	215		
	Watt	W	214	ü	

UNIT TYPE	UNIT NAME	ABREV.	INDEX	Metric	English
Pressure	Atmosphere	atm	086		
	Bar	bar	081		
	Feet of Water (@68˚F)	ft H2O	077		
	Grams per Square Centimeter	g/cm2	085		
	Inches of Mercury (@ 0˚C)	in Hg	078		
	Inches of Water (@ 68˚F)	in H2O	076		
	Kilograms per Square Centimeter	kg/cm2	072		
	Kilopascal	kPa	071		
	Millibar	mbar	082		
	Millimeters of Mercury (@ 0˚C)	mm Hg	083		
	Millimeters of Water (@ 68 ˚F)	mm H2O	084		
	Pascal	Pa	070	ü	
	Pounds per Square Foot	lb/ft2	079		
	Pounds per Square Inch	PSI	073		ü
	Pounds per Square Inch – Absolute	psia	075		
	Pounds per Square Inch – Gage	psig	074		
	Torr (@ 0˚C)	torr	080		
Temperature	Degrees Centigrade	˚ C	001	ü	
	Degrees Fahrenheit	˚ F	002		ü
	Degrees Kelvin	Kelvin	003		
	Degrees Rankine	˚ R	004		
Time	Days	days	009		
	Hour	hr	008		
	Milliseconds				
	Minute	min	007		
	Seconds	sec	006	ü	ü
	Weeks	wks	010		
	Month	mon	011		
	Years	yrs	012		

UNIT TYPE	UNIT NAME	ABREV.	INDEX	Metric	English
Velocity	Centimeters per Second	cm/sec	164		
	Feet per Minute	ft/min	162		
	Feet per Second	ft/sec	161		ü
	Inches per Second	in/sec	160		
	Kilometers per Hour	KPH	169		
	Knots	KNOT	170		
	Meters per Hour	m/hr	168		
	Meters per Minute	m/min	166		
	Meters per Second	m/sec	165	ü	
	Miles per Hour	MPH	167		
	Millimeters per Minute	mm/min			
	Millimeters per Second	mm/sec	163		
Volume	Barrels of Liquid	bbl (Liq)	049		
	Barrels of Oil	bbl (Oil)	048		
	Cubic Centimeter	cc	040	ü	
	Cubic Feet	ft3	044		ü
	Cubic Inch	in3	043		
	Cubic Meter	m3	041		
	Cubic Yard	yd3	045		
	Imperial Gallon	gal (UK)	047		
	Liter	L	042		
	Kiloliters	kl	050		
	U.S. Gallon	gal (US)	046		
Volumetric Flow Rate	Barrels per Day (Liquid)	BPD (Liq)	122		
	Barrels per Day (Oil)	BPD (Oil)	118		
	Barrels per Hour (Liquid)	BPH (Liq)	121		
	Barrels per Hour (Oil)	BPH (Oil)	117		
	Barrels per Minute (Liquid)	BPM (Liq)	120		
	Barrels per Minute (Oil)	BPM (Oil)	116		
	Cubic Centimeters per Hour	cc/hr	091		
	Cubic Centimeters per Minute	cc/ min	090		
	Cubic Feet per Day	ft3/day	105		

UNIT TYPE	UNIT NAME	ABREV.	INDEX	Metric	English
Volumetric Flow Rate	Cubic Feet per Hour	ft3/hr	104		
	Cubic Feet per Minute	ft3/min	103		
	Cubic Feet per Second	ft3/sec	102		¸
	Cubic Inches per Hour	in3/hr	101		
	Cubic Inches per Minute	in3/min	100		
	Cubic Meters per Day	m3/day			
	Cubic Meters per Hour	m3/hr	094		
	Cubic Meters per Minute	m3/min	093		
	Cubic Meters per Second	m3/sec	092	¸	
	Cubic Yards per Hour	yd3/hr	107		
	Cubic Yards per Minute	yd3/min	106		
	Gallons per Hour (US)	gph (US)	110		
	Gallons per Minute (US)	gpm (US)	109		
	Gallons per Second (US)	gps (US)	108		
	Imperial Gallons Per Hour	gph (UK)	114		
	Imperial Gallons per Minute	gpm (UK)	113		
	Imperial Gallons per Second	gps (UK)	112		
	Kiloliters per Day				
	Kiloliters per Hour				
	Kiloliters per Minute				
	Kiloliters per Second				
	Liters per Hour	L/hr	098		
	Liters per Minute	L/min	097		
	Liters per Second	L/sec	096		
	Million Liters per Day				
	Million Gallons per Day (US)				
	Million Gallons per day (UK)				
	Millions of Barrels per Day (Liquid)	MBPD (Liq)	123		
	Millions of Barrels per Day (Oil)	MBPD (Oil)	119		

Point format

The storage formats available only to Input and Output points are listed below. All Tank points are of a fixed data format.

STORAGE TYPE	FORMAT	RANGE
Character	8 Bit Signed	-128 to 127
Byte	8 Bit Unsigned	0 to 255
Short	6 Bit Signed	-32768 to 32767
Word	16 Bit Unsigned	0 to 65535
Coded	16 Bit, Index to Coded Variable	0 to 65535
Long	32 Bit Signed	-2,147,483,648 to 2,147,483,647
Dword	32 Bit Unsigned	0 to 4,294,967,295
Float	4 Byte Floating Point	3.4 E ±38 (7 digits)
Double	8 Byte Double Precision Floating Point	1.7 E ± 308 (15 digits)
Time & Date	8 Byte Time & Date	NA
Time	8 Byte Time Only	NA
Date	8 Byte Date Only	NA
User Defined String	16 Bit Index to User String	0 to 65535

Coded Variables

The following list contains all the standard coded variables that came with your FuelsManager system.

Coded Variables			
1. January	27. >	53. Disable Input	79. High
2. February	28. Abort	54. Disable	80. High-High
3. March	29. Active	55. Disabled	81. Hold
4. April	30. Adv Low	56. Down	82. Holiday
5. May	31. Adv High	57. Early	83. Hour
6. June	32. Advisory Low	58. Emer Shutdown	84. Hours
7. July	33. Advisory High	59. Enable I/O	85. In
8. August	34. All	60. Enable Input	86. Inactive
9. September	35. Auto	61. Enable	87. Increase
10. October	36. Automatic	62. Enabled	88. Increasing
11. November	37. Average	63. Error	89. Indirect
12. December	38. Both	64. Executing	90. Initialize
13. Sunday	39. Bottom	65. Extend	91. Kill
14. Monday	40. Cascade	66. Failure	92. Late
15. Tuesday	41. Clear	67. Failed	93. Left
16. Wednesday	42. Close	68. False	94. Load
17. Thursday	43. Closed	69. Fault	95. Local
18. Friday	44. Closing	70. Flow	96. Locked
19. Saturday	45. Cool	71. Force	97. Lock
20. Normal	46. CoolDown	72. Forced	98. LOS
21. Alarm	47. Days	73. Halted	99. Loss of Signal
22. DB Config Error	48. Decrease	74. Halt	100.Critical Zone
23. Tank Calc Error	49. Decreasing	75. Heat & Cool	101. Movement Alarm
24. Acknowledged	50. Default	76. Heat	102. Low
25. Unacknowledged	51. Direct	77. Strap Error	103. Low-Low
26. <	52. Disable I/O	78. API Corr Error	104. Lower
105. Lowering	135. Reset	164. Unauthorized	194. Lower Head
106. Lowered	136. Resume	165. UnderRange	195. Run Immed Prof
107. Man	137. Reverse	166. Under	196. Follow Wtr Lvl
108. Manual	138. Right	167. Unload	197. Find Wtr Lvl
109. Minutes	139. Run	168. Unlocked	198. Find Datum
110. Month	140. Running	169. Unlock	199. Stowed
111. No Flow	141. Secondary	170. Up	200. Seeking Level
112. No	142. Seconds	171. Vacuum	201. Doing Profile
113. Not Ready	143. Series	172. Valid	202. Doing Dip
114. O/R	144. Shutdown	173. Warmup	203. Finding Water
115. Off Line	145. Start Sequence	174. Week	204. Following Water

Coded Variables			
116. Off	146. Start	175. Winter	205. Finding Datum
117. On Line	147. Starting	176. Xfr by Volume	206. Following Level
118. On	148. Stop Sequence	177. Xfr by Level	207. Servo
119. Open	149. Stop	178. Year	208. NC
120. Opened	150. Stopping	179. Yes	209. One Hour
121. Opening	151. Summer	180. I/O Failed	210. Eight Hours
122. Out	152. Timeout	181. I/O Disabled	211. One Day
123. Override	153. Timed Out	182. Reverse Flow	212. One Week
124. OverRange	154. Top	183. Trans Adv SetPt	213. One Month
125. Over	155. Transitional	184. Trans SD SetPt	214. Last Value
126. Parallel	156. Transfer	185. Scan Failure	215. Goto Zero
127. Pressure	157. Transfer In	186. Gauge I/O Fail	216. Goto Full Scale
128. Primary	158. Transfer Out	187. Device Alarm	217. Hand
129. Raise	159. Transferring	188. Field Cfg Modif	218. Invalid
130. Raised	160. Trip	189. Raise Failure	219. Midnight
131. Raising	161. Tripped	190. Lower Failure	220. Time of Day
132. Ramp	162. True	191. Upload Failure	221. Process
133. Ready	163. U/R	192. DnLoad Failure	222. Fill
134. Remote	164. Unauthorized	193. Raise Head	223. Filling
224. Empty	254. Enraf Slave	284. ETA High Level	314. Run Down
225. Emptying	255. GPP	285. ETA Low Level	315. Charge
226. Test	256. GPU	286. ETA LoLo Level	316. Blend
227. Testing	257. CIU	287. DB Empty	
228. Stopped	258. Block	288. Not Programmed	
229. Xfr by Diff.Vol	259. Freeze	289. DB Download	
230. In Progress	260. Lock Test	290. Programming	
231. Advisory	261. Get ID	291. Leak Probe	
232. Complete	262. Set Gauge Data	292. Generic Gauge	
233. Overfill	263. Get Stored Data	293. GPE Master	
234. Minimum	264. Rejected	294. Out of Service	
235. Maximum	265. Auto Configure	295. AC	
236. RTU Master	266. Redundant	296. DC	
237. RTU Slave	267. Independent	297. Fifteen Minutes	
238. TIWAY Master	268. Download	298. Port 1 Fail	
239. TIWAY Slave	269. Upload	299. Port 2 Fail	
240. MODBUS Master	270. Whessoe Bus	300. Print	
241. MODBUS Slave	271. TSU Slave	301. Printer	
242. HART Master	272. AB Slave	302. V1 Master	
243. HART Slave	273. AB Master	303. Rackbus Master	
244. Peer to Peer	274. Standard	304. Upper Int Level	
245. Local Diag	275. Enhanced	305. Mid Int Level	

Coded Variables			
246. IMUX Master	276. Follow Level	306. Upper Density	
247. IMUX Slave	277. LON	307. Middle Density	
248. LRC	278. MTS Master	308. Bottom Density	
249. CRC	279. Measure	309. Rel Over Tens	
250. Passive	280. Set Time	310. Calibration Act	
251. L&J Master	281. Start Leak Mode	311. Shipment	
252. L&J Slave	282. Stop Leak Mode	312. Receipt	
253. Enraf Master	283. ETA HiHi Level	313. Water Drain	

Modifiers

The standard FuelsManager modifiers are listed below. Modifiers are used when the coded variable data format type is selected. You can select a modifier from the available list or create a custom modifier.

MODIFIER NAME	COMMAND						
	1	2	3	4	5	6	7
Active/Inactive	Active	Inactive					
Enable/Disable	Enable	Disable					
Manual/Off/Auto	Manual	Off	Auto				
Manual/Auto	Manual	Auto					
On/Off	On	Off					
Open/Close	Open	Close					
Raise/Lower	Raise	Lower					
Run/Stop	Run	Stop					
Start/Stop	Start	Stop					
Start/Stop/Reset	Start	Stop	Reset				
Trip/Reset	Trip	Reset					
Up/Down	Up	Down					
Fill Mode	Inactive	Xfr by Level	Xfr by Volume	Xfr by Diff Vol	Xfr by Mass	Xfr by Diff Mass	
Tank Mode	Stop	Fill	Empty	Run	Test	Reset	
ITG 60/70	Raise Head	Lower Head	Clear	Run Immed Prof	Follow Wtr Lvl	Find Wtr Lvl	Find Datum
ITG 50	Raise Head	Lower Head					
Tank Mode 2	Stop	Fill	Empty	Run	Test	Reset	Out of Service
NMS530	Follow Level	Raise	Stop	Upper Int. Level	Upper Density	Reset	

Tank strapping table

The file format defined below is the format of strapping table files exported by FuelsManager.

874969854,	(09/22/97 19:10:54)
Vol Test Tank 6B (fixed roof),	
27,46,64,	(Level Units = ft/inch/16th, Volume Units = U.S. Gallon, Mass Units = Pound)
0,	(Roof Mass)
60,	(Strap Temperature)
50,	(Strap Density)
5,	(Pin Height aka Critical Low)
7,	(Critical Zone aka Critical High)
21,	(21 of strapping entries)
0-00-00, 0.00,	(Entry #1)
0-01-00, 2085.00,	(Entry #2)
0-02-00, 4212.00,	(Entry #3)
0-03-00, 6250.00,	(Entry #4)
0-06-00, 12512.00,	(Entry #5)
0-10-00, 20813.00,	(Entry #6)
1-00-00, 25015.00,	(Entry #7)
2-00-00, 50123.00,	(Entry #8)
3-00-00, 75045.00,	(Entry #9)
4-00-00, 100000.00,	(Entry #10)
6-00-00, 150762.00,	(Entry #11)
10-00-00, 250094.00,	(Entry #12)
11-06-00, 287645.00,	(Entry #13)
12-00-00, 300184.00,	(Entry #14)
20-00-00, 500003.00,	(Entry #15)
23-00-00, 500003.00	(Entry #16)
27-00-00, 675111.00	(Entry #17)
30-00-00, 750197.00	(Entry #18)
35-00-00, 875096.00	(Entry #19)
36-00-00, 900000.00	(Entry #20)
40-00-00, 1000000.00	(Entry #21)

Numerics

8130 RTU, sealing the point 238

A

acknowledged alarm 48
alarm categories 13, 14
alarm logs 64
alarm templates
  creating 51
  editing 52
  exporting 53
  importing 53
  opening list of 50
  predefined 46
  understanding 50
alarms
  accessing configuration for a point 54
  display mode 48
  displaying date, time, user name 49
  global
    assigning to point 52
    creating 51
    definition 46
    editing 52
    exporting 53
    importing 53
    opening list of 50
    understanding 50
  graphics 56
  help files 56
  Leak Detection 187
  limits
    accessing 59
    building with Build button 61
    creating 60
    deleting 60
    editing 60
    reset holdoff 60
  local
    assigning 54
    creating 54
    definition 46
    editing 55
  logs 64
  points 69
  predefined 46, 47
  removing from database point 57
  tank points 86
  templates
    creating 51
    definition 46
    editing 52
    exporting 53
    importing 53
    opening list of 50
    understanding 50
    tolerance 60
    types 46
    user-defined 46
appends 151, 165
architecture, system 4
ArchiveManager 8
  about 109
  configuration 110
  EOM Backup 114
  Leak Detection 184
  opening 109
  point variables 114
  records 116
audit 23
Automated Data Output
  configuring 195, 198
  output file types 194
  program location 193

B

bar graphs 163
bit field data sources 104
bitmaps 170
blend 127
buttons 151, 165

C

calculation methods 199
categories 12
  alarm 13, 14
  tag 15
charge 128
coded variables 34
CommManager 8, 119
communications interfaces
  creating 119
  maintenance 123
communications port, configuring 121
communications, configuring 119
conditions, dynamic 173
Configuration 292
Configuration application 8
  exiting 25
  opening 25
copying points 105
creating
  graphic 153
  symbols 155
  template graphic 153
customizing tank detail screens 176

D

Data Dictionary 276
data format, points 69
data source 67
data sources

assigning 99
bit field 104
database
introduction 65
levels 72
real-time 4
updating 143
database points
accessing alarms configuration 54
copying 105
creating 72, 74, 78, 82
data sources 99
exporting 57
importing 57
parameters 295
removing alarm from 57
removing event from 63
renaming 105
translation tables 39
types 66
DataManager 7
default settings, Draw 159
deleting reports 266
device configuration 122
Draw
appends 151, 165
application 9
bar graphs 163
bitmaps 170
buttons 151, 165
conditions 173
default settings 159
drawing shapes 160
drawing space setup 149
editing 171
exiting 148
grid 149
keyboard shortcuts 179
labels 161
opening 148
redrawing screen 172
symbols 165
toolbar 149
tools, basic techniques 158
values 162
window 148
drawing space 149
dynamic conditions 173
dynamic reports 259

E

editing
graphics 171
objects 171
reports 264
edition features comparison 2
engineering units 67
EOM Backup, ArchiveManager 114
error messages, System Update Utility 145
event logs 64
events
creating 62
definition 62
editing 63
logs 64
points 69
removing from database point 63
exiting
Draw 148
FuelsManager Report Editor 251
exporting
alarm templates 53
global alarms 53
points 57
product movements 140

F

features comparison 2
file directories, FuelsManager 27
files
graphic 152
merging 158
purging 158
saving 157
report 265
symbols 152
FMDataManager 7
FMSystemManager 6
FMTools directory 28
formatting reports 261
FuelsManager Configuration 8
FuelsManager Draw 9
FuelsManager file directories 27
FuelsManager interface 10
FuelsManager Oil & Gas
overview 1
FuelsManager Operate 9
FuelsManager Report 9
FuelsManager Report Editor
exiting 251
opening 251
tools and objects 252
FuelsManager Web Server 269

G

generating files 155
generating reports 265
global alarms 46
assigning to point 52
creating 51
editing 52
exporting 53

importing 53
opening list of 50
understanding 50
global alarms, predefined 46
graphic
creating 153
graphic files 152
Graphic Index 156
graphics
appends 151
buttons 151
creating 153
creating a symbol 155
customizing tank detail screens 176
Draw
appends 151, 165
bar graphs 163
bitmaps 170
buttons 151, 165
conditions 173
default settings 159
drawing shapes 160
drawing space setup 149
dynamic conditions 173
editing 171
grid 149
keyboard shortcuts 179
labels 161
redrawing screen 172
symbols 165
tools 158
values 162
window 148
exiting Draw 148
file indexes 156
files 152
merging 158
purging 158
saving 157
for alarms 56
generating files 155
grid, Draw 149
indexes 156
opening Draw 148
template graphic 154
graphs, bar 163
grid, Draw 149
groups, movement 138

H

help files
for alarms 56
managing 36
historical reports 267
history, movement 133
hybrid tank calculations 230
hydrostatic tank calculations 230

I

I/O point connections 122
importing
alarm templates 53
global alarms 53
points 57
product movements 140
indexes 156
input points
creating 74
definition 66
interface
communications 119
FuelsManager 10

K

keyboard shortcuts, Draw 179

L

labels 161
Leak Detection
alarms 187
ArchiveManager 184
Edit Tank Data 186
explanation 181
Mass Analysis 182
security 183
tank analysis methods 191
tank analysis types 182
Volumetric Analysis 181
levels, database 72
licensing options 1
limits, alarm
building with Build button 61
creating 60
deleting 60
editing 60
reset holdoff 60
limits, alarms 59
local alarms
assigning 54
creating 54
definition 46
editing 55
locked interfaces and devices 121
logging in to Web Server 269
logs 64
lookup tables 39
LPG calculations, sample 227
LPG quantity calculation 220

M

maintenance communications interfaces 123
Mass Analysis 182

merging graphic files 158
modifiers 35
modules, sealing 246
movement
  history 133
  paths 133, 139
  summary 131
  types 127
Multi-Monitor 291
Multi-Monitors 291, 292

N

nodes, movement 134

O

objects, editing 171
OPC servers 70
opening
  Draw 148
  FuelsManager Report Editor 251
Operate
  application 9
  tabbed window display 44
output points
  creating 74
  definition 66

P

parameters, point 295
password, Weights & Measures 248
paths, movement 133, 139
permissions
  user group 19
point variables, ArchiveManager 114
points
  alarms 69, 86
  attributes 66
  copying 105
  creating 72, 74, 78, 82
  data format 69
  data source 67
  data sources 99
  database levels 72
  engineering units 67
  events 69
  exporting 57
  importing 57
  parameters 295
  renaming 105
  scale limits 67
  tag category 69
  translation tables 39
  types 66
port, communications 121
predefined
  alarms 46
  reports 251
Prerequisites 291
product movement
  exporting 140
  groups 138
  importing 140
  movement
    history 133
    paths 133
    summary 131
    types 127
  movement paths 139
  nodes 134
  transfer modes 129
  Xfr modes 129
product strapping tables 206
products
  system resources 29
  Web Server 276
Professional Edition 2
purging graphic files 158

R

real-time database 4
receipt 128
records, ArchiveManager 116
redrawing graphics screen 172
regional settings 278
remote systems 10
renaming points 105
Report application 9
Report Editor, opening 251
Report Manager, opening 283
ReportManager 8
reports
  deleting 266
  dynamic reports 259
  editing 264
  exiting FuelsManager Report Editor 251
  files 265
  formatting 261
  generating 265
  historical 267
  opening Report Editor 251
  predefined standard 251
  summary reports 254
  tools and objects 252
  Web Server 281, 282
reset holdoff 60
run modes, subsystem 25
run-down 128

S

saving graphic files 157
SCADA 2
scale limits 67

scaling functions 42
sealing
  FuelsManager modules 246
  tank point variables 243
  the point 238
security
  alarm categories 13, 14
  audit 23
  categories 12
  Leak Detection 183
  opening the Security window 11
  permissions, user group 19
  tag categories 15
  users and user groups 16
  Web Server 272
servers, OPC 70
services 6
shapes, drawing 160
shipment 129
sites, Web Server 270
Standard Edition 2
standard reports 251
Start Definitions 38
Strap Table Volume 203
strapping tables, product and water 206
strings 32
subsystem run modes 25
summary reports 254
summary, movement 131
Symbol Index 156
symbols
  creating 155
  files 152
  placing in a graphic 165
system
  architecture 4
  parameters
    coded variables 34
    file directories, FuelsManager 27
    FMTools directory 28
    help files 36
    modifiers 35
    Operate tabbed window display 44
    products 29
    Start Definitions 38
    strings 32
    subsystem run modes 25
    tank detail display, default 43
    ViewRTU directory 29
System Update Utility
  before updating 143
  error messages 145
  running 143
  troubleshooting 145
SystemManager 6
systems seals 248

T

tabbed window display setting 44
tables, translation 39
tag categories 15
tag category
  points 69
tank
  analysis methods, Leak Detection 191
  calculations, traditional 203
  calculations, typical 232
  detail display, default 43
  detail screen, customizing 176
  farm monitoring, Web Server 278
  points
    alarms, configuration 86
    alarms, predefined 47
    creating 82
    definition 66
template graphic 153, 154
templates, alarm 46
toolbar, Draw 149
TOV 203
traditional tank calculations 203
transfer 129
transfer modes 129
translation tables 39
triggered points
  creating 78
  definition 66
types of alarms 46

U

unacknowledged alarm 48
units, engineering 67
updating the database system 143
user groups
  Standard or Professional Edition 16
  Web Server
    adding 272
    introduction 271
user-defined alarms 46
users
  Standard or Professional Edition 16
  Web Server 271

V

values 162
ViewRTU
  directory 29
  sealing the point 238
volume
  calculation methods 199
  correction techniques 200
Volumetric Analysis 181

W

W&M
- indicator 245
- password 248

water strapping tables 206
water-drain 129
Web Server
- configuring overview 269
- Data Dictionary 276
- logging in as administrator 269
- products 276
- regional settings 278
- reporting 281
- reports 282
- security 272
- sites 270
- tank farm monitoring 278
- user groups 271
- users 271
- Users & User Groups 272

Weights and Measures
- 8130 RTU 238
- applying the software seal 241
- displaying W&M indicator 245
- overview 237
- password 248
- sealing
  - FuelsManager modules 246
  - tank point variables 243
  - the point 238
- software seal 241
- system overview 238
- systems seals 248
- ViewRTU, sealing the point 238

X

Xfr modes 129

Document Code
ADM010GVAE00713

Varec, Inc. • 5834 Peachtree Corners East, Norcross (Atlanta), GA 30092 USA
Tel: +1 (770) 447-9202 • Fax: +1 (770) 662-8939
www.varec.com

© 2006 Varec, Inc. All Rights Reserved. This document is for information purposes only. Varec, Inc. makes no warranties, express or implied, in this summary. The names of actual companies and products mentioned herein may be the trademarks of their respective owners.